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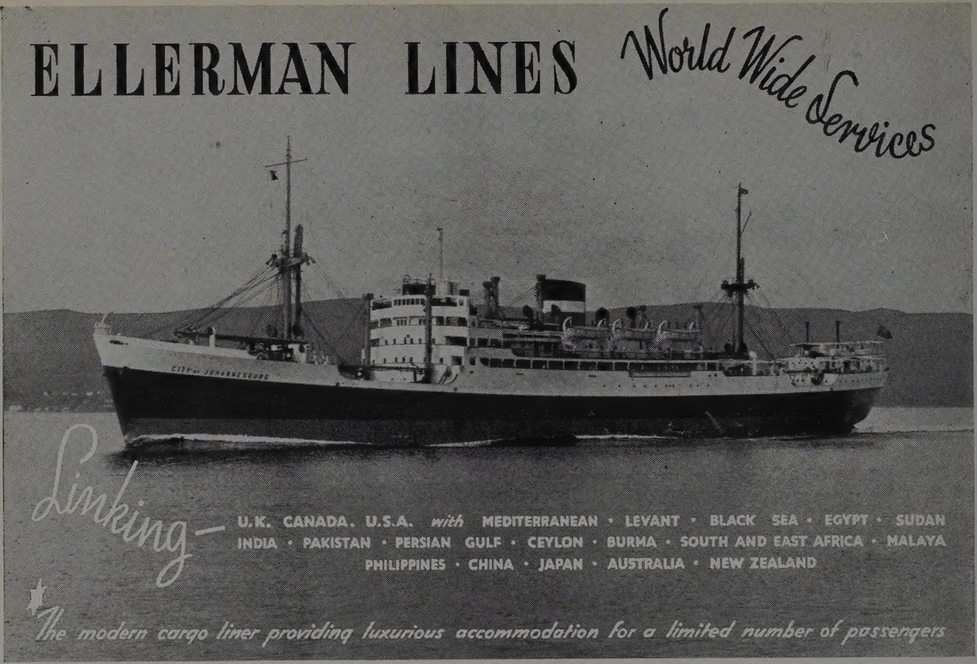

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Reclaiming the Zuiderzee: The Social Consequences

by D. J. de HAAN

Much has been published in other countries about the feats performed by Holland's engineers in reclaiming the Zuiderzee: very little about the problems involved in the settlement of the reclaimed lands or the methods adopted for their solution. Dr de Haan surveys these, with special reference to the new North-East Polder, where experience gained elsewhere is now being applied

WHEN, in 1918, the Netherlands Government passed a Bill for the reclaiming of the Zuiderzee a new social policy was inaugurated. In the 17th century land reclamation was undertaken by financially interested merchants. The project of draining the Haarlemmermeer in the 19th century was a governmental enterprise, carried out because the lake threatened the adjacent regions with inundation. But in the 19th (as in the 17th) century the conversion of the reclaimed area into agriculturally productive land was left entirely to the new colonists, for according to the 'liberal' views of that time the state intervened only when the welfare of the country was at stake.

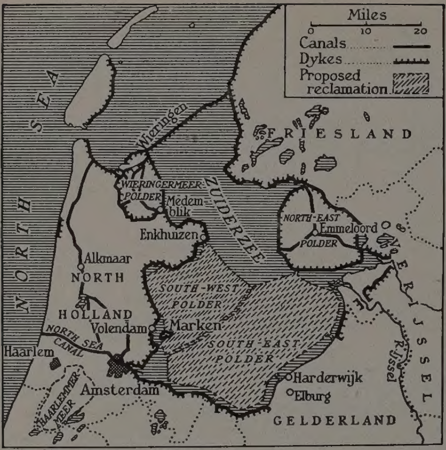
The Zuiderzee project was, however, to be undertaken in a different spirit. Its reclamation had long been mooted; but owing to the magnitude of the task and the expense involved, the authorities discouraged each fresh private proposal. The state would be able to carry out such a gigantic work, it is true, but people did not consider this to be in the public interest. The Zuiderzee Society, founded in 1886, directed public attention less to the advantages of winning new land than to others dependent on enclosing the Zuiderzee: to the practicability of eliminating dangerous high waters during storms and of irrigating the surrounding regions (North Holland and Friesland) with fresh water, which had previously been impossible.

The plans designed by the Zuiderzee Society were carefully examined by a commission which recommended them to the government. Cabinet crises and the outbreak of the First World War delayed their execution. Subsequently the war, which cut off supplies from overseas, and the Zuiderzee flood disaster of 1916 brought home to the Dutch people the necessity of providing more arable land for the growing of foodstuffs; and the proposals embodied in the Act of 1918 were passed by Parliament without a division. This Act, in brief, provided for a dyke from the North Holland coast, via Wieringen Island, to Friesland; the draining of four polders within the section cut off; and the leaving of a part undrained where a fresh-water lake would be formed as a catch-water basin for the River Ijssel and for irrigation purposes. On completion of the plan some 220,000 hectares (1 hectar=nearly 2½ acres) of new land—or about seven per cent of the entire Netherlands territory—would be gained.

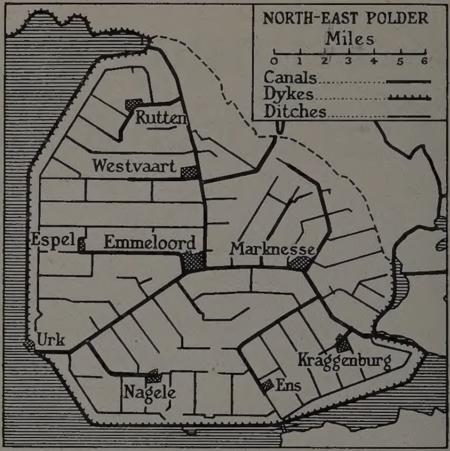
Work began in earnest in 1926 on both the Zuiderzee sealing-off dyke (completed in 1932) and the dyke around the Wieringermeer; the latter was finished in 1929, and by August of the following year its colossal mass of water (some 600,000,000 cubic metres) had been entirely pumped out, exposing 20,000 hectares of land ready for cultivation.

It had early been realized that the cultivation of so large an area could not be left to individual farmers, as in the past; for experience gained in the Haarlemmermeer (where about forty-two per cent of the polder was still under water six years after reclamation started) showed that the cost of converting newly drained lands to agricultural fields was so great in money and labour that the community would obtain nothing like the maximum potential benefit from the expenditure of the pioneers, still less so the pioneers themselves. A government committee appointed in 1926 to study distribution of the Wieringermeer farms had decided that it would be inadvisable to let the new land be managed by the future tenants during the first years. Arrangements were therefore made for its cultivation to be undertaken by a state-financed body, the "Service for the Cultivation of the Wieringermeer".

After reclamation intensive draining was started by means of canals, ditches and



A. J. Thornton



trenches. (The polder is kept dry by means of an electric and a diesel pump installation, for which a draining system, about 240 km. in length, has been laid out.)

When, after a waiting period, the soil showed a sufficient decrease of salinity under the influence of rainwater, rye was sown, first on the newly dried sandy soil to prevent wind erosion. (Where clay happened to be present under the top layers it was dug up by machines and spread over the surface.) After the sowing of rye in the autumn a mixture of grass and clover was sown in the spring, transforming the sandy soil into grassland.

The clay grounds, where de-salination took longer, were at the first possible moment sown with clover under a cereal nurse-crop. The clover was subsequently ploughed under for green manuring. This process was repeated in the second year, with a certain rotation of crops, which this time were undersown with red clover or lucerne to be harvested. Only then were drain-pipes laid, the earth now being firm enough to prevent their sagging.

During the first years the exploitation of the lands was undertaken by the government. The parcelling out of the Wieringermeer was not only a technical and agrarian problem, but also a social one, because both the future size of the farms and the eventual number of settlers was largely determined thereby. How big, on the one hand, could a section of land be to ensure profitable mechanization without making the transport routes to and from the farmhouse too long? At what point, on the other hand, would the multiplication of ditches (separating the sections) involve prohibitive expense? Finally various types of sections were adopted, the majority measuring about 800 by 250 metres, or 20 hectares.

The authorities were active in many ways: in the northern part of the polder some 400 hectares unsuitable for agriculture were afforested; while for the farming lands labour had to be supplied and the men housed in permanent buildings, for the provision of which a housing society was founded; and three villages were planned with carefully laid-out streets, shopping centres and sites for the development of industries, schools and sports. In 1932 work on the first village started and some thirty dairy farmsteads of three different types were erected. Then, when the leasing of the first arable land was possible, five types of standardized barns were evolved, suitable for being adapted to every kind of farm. And now, with the establishment of a settlers' colony, the time had come to switch over from public to private enterprise.

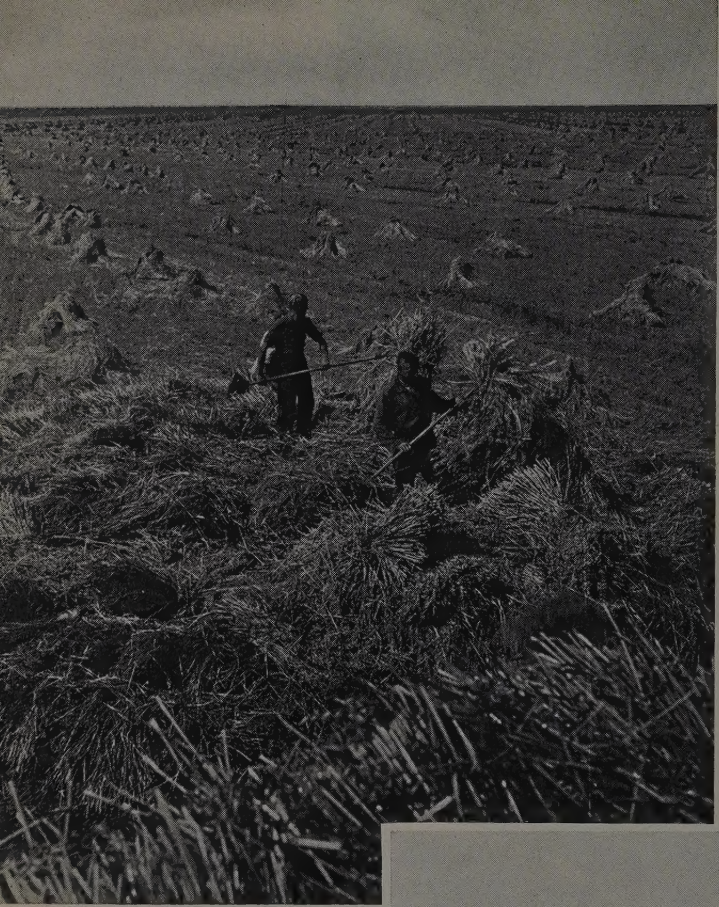
With the arrival of the first farmers the settlement of tradespeople had to be faced. As the government had decided to maintain control of the land, and as the leasing system generally applied to the farmers was not suitable for business people, it chose the long-lease contract form; land was offered, therefore, on a sixty-year lease.

In connection with farm lease contracts (on a six-year basis, with option for renewal), rents were kept very low for two years and not increased to normal until the sixth year. By 1934 the first drained farms had been brought under cultivation so successfully that, owing to this fact, together with their practical layout and favourable lease conditions, interest in the polder increased considerably; and by 1939 more than 1000 people were applying

In reclaiming the Zuiderzee the first steps taken are always to build a dyke and then to drain out the sea. After rain-water has washed out the salt that remains in the earth, grasses that bind the soil are planted. (Left) *After ploughing, the newly-reclaimed earth of the North-East Polder is harrowed before the first planting. The surface has not yet been split up into sections. In the distance a barn is under construction*

l photographs from Black Star

(Right) *The reclamation of the North-East Polder has been taken a stage further and drainage ditches divide the land into farm-sections. The farmer is hoeing a root crop. Given the supply of labour of which Holland is assured, for this operation a horse is more efficient economically than a tractor*



A sweeping expanse which is reminiscent of the prairies of North America, though actually part of the North-East Polder, newly reclaimed from the Zuiderzee. The lack of variation is accounted for by the fact that while the land is under state management as many as 300 hectares may be given over to one crop. The oats here being stacked help to bind the soil as well as being very valuable as cereal

Threshing in the open field is done whenever the weather is favourable. Both horses and mechanical equipment are used. This boundless stretch has now been split up into a number of private holdings, the state still maintaining a few farms to serve as models both for costs and technique. To be selected as farmers on the reclaimed land applicants must have been trained in the most modern farming methods

for the leases of fifty-one holdings. In addition, about 1000 hectares were set aside for the erecting of thirty-seven state farms of every type, which enabled the authorities to ascertain, on a profit and loss basis, what rents should be charged to the farmers.

There was one respect in which the reclamation of the Wieringermeer Polder had special social significance. With previous reclamations the initial period of first cultivation had proved one of natural, but merciless, selection among the settlers. In the case of the Wieringermeer the authorities substituted for this a deliberate preliminary selection. Only those able to guarantee sufficient capital, to the amount of 300 guilders (about £15) per hectare, were considered as tenants; and, in addition, they must be physically fit and skilled farmers who had received adequate training at an agricultural college. In consequence, financial and technical worries were largely eliminated; while the provision of good accommodation and adequate medical services resulted in a general improvement of health, as against the doubling of the death rate experienced in older polders. The present population, being largely composed of youngish people, has a high birthrate and, owing to its selective nature, enjoys an unusually high intellectual level for a rural district, as most of these farmers, having come from well-to-do families, were enabled to continue their education after leaving elementary school.

It is therefore a safe conclusion that, thanks to the superiority of the settlers, and the favourable economic conditions created for them, the new agricultural lands will set an example to agrarian Holland; while the pioneering experimental services rendered by the Agricultural Information Department in the polder, and the absence of conservatism inherent in a young community, act as stimuli to the discovery of new methods in agriculture.

On September 9, 1942, the draining of a new polder was begun. This time it was the North-East Polder, situated against the provinces of Friesland and Overijssel. In about eighteen months two pumps drained away more than twice the mass of water of the Wieringermeer; an endless plain, 48,000 hectares of new land, then lay ready for cultivation.

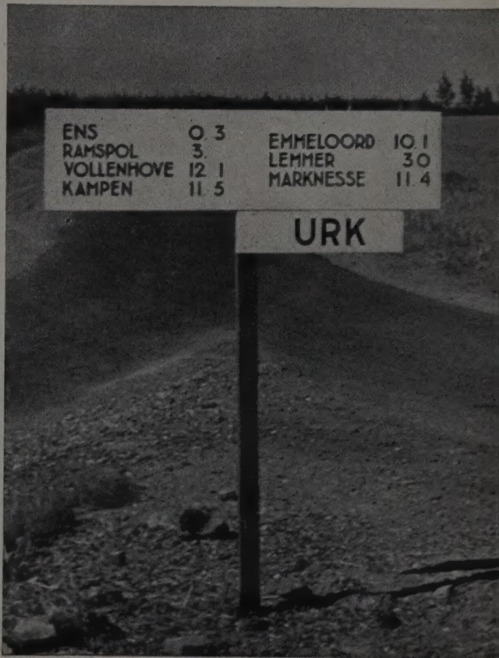
Owing to war conditions the cultivation of this polder took much longer than had been the case with the Wieringermeer. The German Occupation Forces were engaged in a systematic plundering of Holland's economic apparatus. Lack of raw materials, as well as energy, was noticeable everywhere; while the requisitioning of Dutch workers made most labourers afraid to accept employment in the polder, where they would soon be spotted by the Germans and carried off to do war-work in factories.

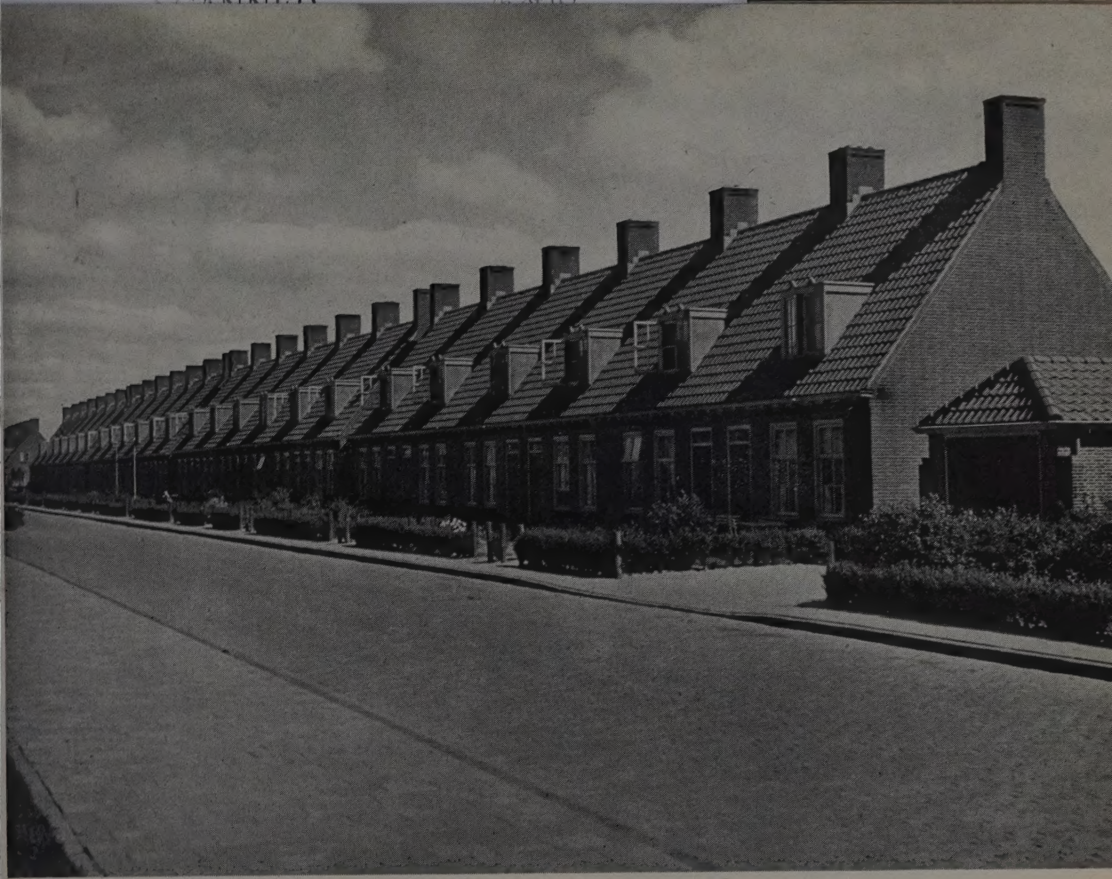
Cultivation problems were the same as in the Wieringermeer and the experience gained there was of inestimable value for the new polder. The latter was divided into two parts, respectively 4.50 and 5.70 metres below sea level; the first (13,000 hectares in area) was drained by one pumping installation, and the second (35,000 hectares) by two. The canals were largely dredged before the reclamation, with the advantage that the redeemed clay could be used to cover and fertilize a few hundred hectares of sandy and less fertile land. In addition, ditches and temporary drains had to be dug. The ditches would also serve as borders of the separate sections after they had been allotted to the new farmers. Experience gained from the various systems of layout in the Wieringermeer resulted in the selection of a uniform section measuring 800 by 300 metres (24 hectares), giving the farms a standard regularity of size (12, 24, 36, etc. hectares).

For the preparation of the ground an experimental farm of 40 hectares was started; and another 100 hectares of fields were spread over the entire polder. A careful examination of the soil preceded the giving of advice to the farmers on draining, drying, the improvement of soil structure, and other matters. A microbiological department provides the data for establishing a proper bacterial flora in the soil. A difficult problem in this polder was the rapid growth of the natural vegetation. (In the case of the Wieringermeer the problem was less urgent because the soil there contained a great deal of salt in the beginning. On account of the closing of the Zuiderzee there was considerably less in the North-East Polder.) As in the case of the Wieringermeer, drain-pipes could not be laid until the soil had settled down.

During the cultivation programme there was a serious shortage of labour, and mechanization was rendered impossible owing to lack of machinery and, more particularly, of fuel; after the liberation, however, mechanization on a larger scale could begin. In the Wieringermeer the digging of ditches and channels had been done by navvies, but another method was planned in the North-East Polder. The original idea was to let all the young farmers, farm labourers, and farm navvies carry out this pioneering work.

Until September 1942, Urk was an island set in the Zuiderzee, the home of fisher-folk who used the 'dead sea' as the main source of their subsistence, only sometimes adventuring out to the North Sea. Then two arms of a dyke stretched out from the mainland and met at Urk, and the North-East Polder was about to be reclaimed. Drainage was slow enough for the islanders to have a brief spell of affluence when eels replaced salt-water fish, but within the firm embrace of the dykes the land finally hardened sufficiently for roads to be laid on it. When one morning a bus drove from the mainland to Urk the erstwhile island knew it was now merely the harbour of the North-East Polder. (Left) *A homely scene in Urk. The streets are so narrow that no motor-cars are ever allowed inside.* (Below) *The addition of another name to a sign-post outside Ens marks the end of an epoch for a small town*





The chief town of the North-East Polder, Emmeloord, is named after its mediaeval predecessor on the same site, engulfed by the sea. Planned for a population of from 8000 to 10,000, against the 750 to 2000 of other towns in the Polder, Emmeloord has been placed in the centre of the area as a result of the lessons learnt from the prior-constructed Wieringermeer Polder. There, as none of the three towns were central, the administrative centre had little economic life or culture. (Above) *A row of newly-built workers' houses in Emmeloord.* (Right) *Equipment for the farms near Emmeloord awaiting transport*

There would then be sufficient manpower throughout the whole year to prepare the soil for cultivation and to plant it. In addition, from these groups the new settlers and farmers could easily be selected. The plan, however, could only be partially executed; as during the war years a number of townsmen were taken on for the work, many of whom, not being used to hard manual labour, deserted their jobs.

There are opportunities for the pioneer farm worker to rent a small plot after a time. In the Wieringermeer the farms were leased to subscribers, designated in advance, from the old lands; but here the farmers first had to do a few years of pioneering work and on the same conditions as applied to farm labourers. This required a great deal of perseverance, the more so because it was impossible, as a result of the shortage of materials, to estimate when the farms would be ready for giving out. During 1947 the first group of farms was allotted to these pioneers. In this case, also, creditworthiness was demanded: namely, 250 guilders per hectare had to be paid from personal funds and 750 guilders per hectare from banks, and under security. About 100 farms were dealt with, totalling 2700 hectares. Owing to the lack of materials the construction of farm buildings on a large scale has been out of the question so far. Only some sixty farms, used as centres for the cultivation of all suitable land, are permanent.

There are plans for eleven projected centres of population, including the capital, Emmeloord; the name emanates from a town which is supposed to have existed during the Middle Ages, and vanished through the incursions of the Zuiderzee. More attention has been given to the location of the villages than was the case in the Wieringermeer, where none of the three villages are centrally situated, as a result of which the administrative centre did not also become the cultural and economic centre. It is estimated that Emmeloord will have a population of 8000 to 10,000, and the other places between 750 and 2000 inhabitants. The total population of the polder will be some 40,000, half of which will depend on agricultural production. In Emmeloord a few hundred dwellings have been completed. The state has again started a few experimental farms of every kind so as to carry out an effective check of private enterprise. The plan is to keep 2000 to 3000 hectares under government management. In the future it is intended to establish horticulture as well, including orchards and market-gardens.

Our preoccupation with the creation of new land and the founding of a new community has made us forget, for the moment, the fate of the original inhabitants. During the 17th century the Zuiderzee was an important artery of communication for Western Europe. On account of the increased tonnage of the ships, however, it lost its value in that respect; and Amsterdam was given a direct communication with the North Sea through the building of the North Sea Canal.

Although no longer a means of communication for shipping, the Zuiderzee nevertheless provided a rich fishing ground. Its mixture of fresh and salt water made a first-class home for certain kinds of fish, particularly the herring, anchovy, plaice, eel and smelt; while in addition great shoals of herring came every year for spawning.

Along the entire coastline and on both the inhabited islands of the Zuiderzee live the fishermen. The chief centres were Enkhuizen, Urk, Elburg, Harderwijk, Bunschoten, Huisen and, above all, Volendam and Marken, the Mecca of Americans. In 1905 the fishing fleet consisted of about 1730 ships manned by 3017 men. They were sailing-vessels, and fished with every kind of tackle. Only a few fishermen from Enkhuizen and the island of Urk ventured to go out to the North Sea. The fishing industry further comprised a not inconsiderable smoking and salting section.

The sealing off of the Zuiderzee, however, completely changed the character of the industry. Migratory fish, like herring and anchovy, could no longer reach the grounds and, as the water became increasingly fresher, certain types of fish were doomed to disappear. Besides, the reclamations would decrease considerably the size of available fishing grounds. Measures to help the fishing population were consequently imperative. From a social angle these again presented an entirely novel problem involving not, in the first place, a matter of paying out compensation, but the switching over of an industrial group to completely new occupations. Consequently, when the Act for the reclamation of the Zuiderzee was passed, among the measures which it envisaged were the financing and giving of training of an industrial nature to the children of the men concerned; assistance for the change-over of existing businesses by the granting of credits; compensation in respect of learning a new trade, and pensions for those too old to learn one. Subsequently the carrying out of the terms of the Act was entrusted to a special government department. The reduction of

(Above) *Monday afternoon in Urk, the main harbour of the North-East Polder, with the ships in from the weekend fishing and the family washing on the line.* (Below) *Making roll-mop herrings in Spakenburg, a small town in Utrecht, on the south coast of the Zuiderzee. This town may be threatened by the proposed southern polders*

the fishing grounds and that of the fishing population rendered a very restricted fishing possible and therefore demanded a system of permits. In 1947 only 913 ships were allowed to fish in the Zuiderzee, the chief kinds of fish caught being perch, eel, smelt, plaice and bream. During that year the value of the total catch amounted to 17,000,000 guilders.

Only a few of the Urk fishermen still go out to the North Sea. A number of concerns have been modernized for the purpose, but this fishing is much restricted now owing to the trawling done there, which makes fishing off the coast very unprofitable. In spite of credits granted by the government, the traditional North Sea fishing has dwindled appreciably; some of the Urk concerns, which on account of obsolete equipment cannot go out there, have been given permits to fish in the Zuiderzee.

Elderly members of the fishing population receive financial assistance, and during 1947 there were 1943 men who qualified for it. The change-over from the old to the new trade took shape in varying ways, according to the economic and geographical circumstances, and the difference in the characteristics of the population. Local industries were established to increase opportunities for suitable work. In many fishing villages the boys no longer take up the fishing trade. Nevertheless a further contraction of the industry is still to be expected in due course, because the demand for fish in the immediate post-war years has not conduced to an early reduction of the number of fishing establishments.

Relationships between the new and the old lands have found clear expression only in the Wieringermeer. The polder population soon built up its own society, which formed a marked contrast with those from the surrounding districts. The arable farmer of the new polder had little in common with the dairy farmer of West Friesland and the small market-gardener. On the other hand, the contact of arable farmers with lucerne-drying plants in the vicinity has greatly increased. A town like Medemblik, however, found its expectations of a new selling market not realized. The population concentrated itself on its own centres.

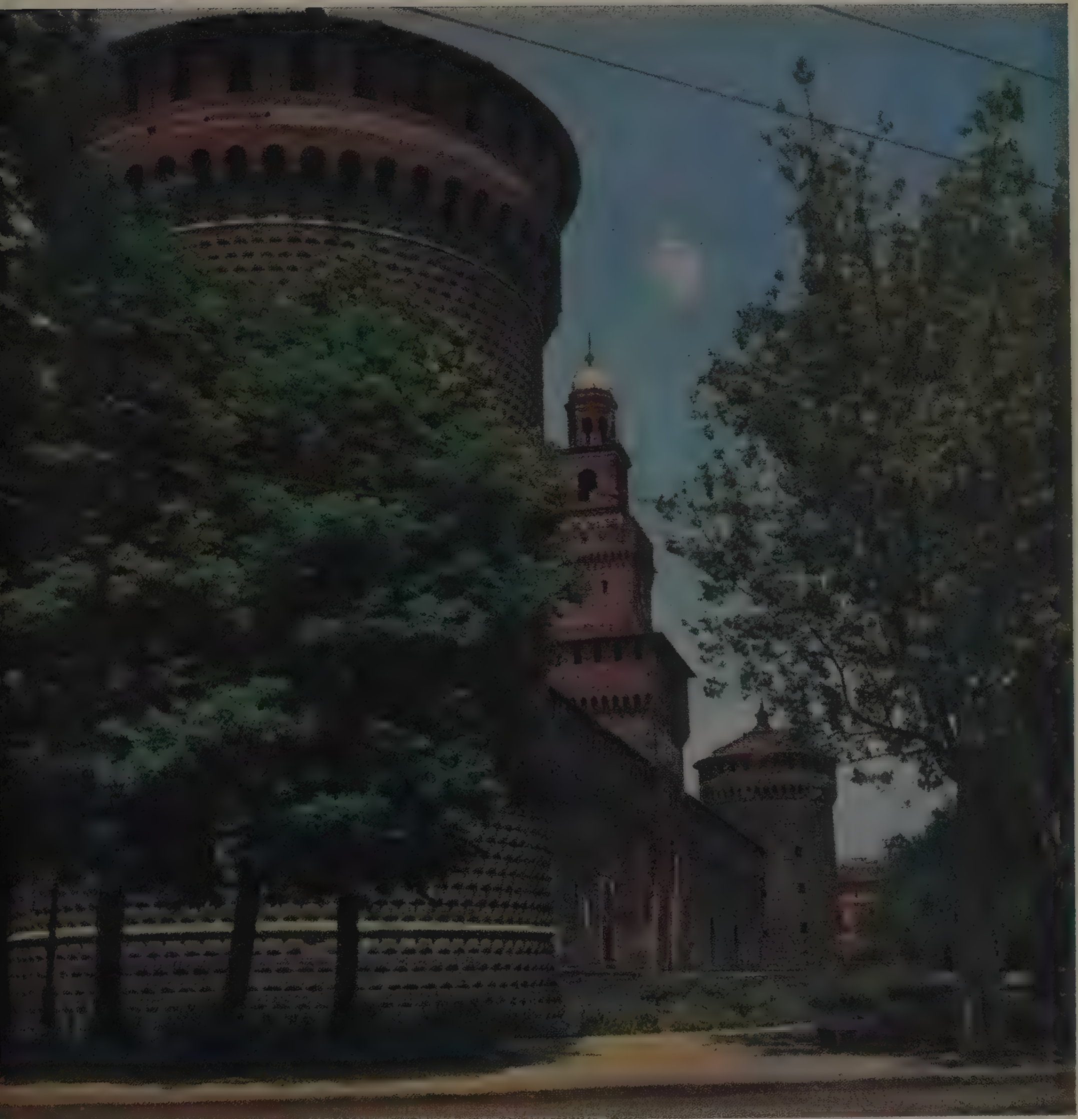
As for the North-East Polder, there are as yet but few signs of adjustment or of contrast with the people of the surrounding districts, because no settlement on a large scale has taken place up to now. Only last year Urk was linked up with the mainland through the North-East Polder by means of a new road.

"A people that lives builds its own future" is written on the monument where the last gap in the sealing off dyke was closed. The future looks less bright than in 1920, when work on the project was started. The last crime of the Germans consisted of the inundation of the Wieringermeer. Although the soil escaped destruction, intensive warfare could not have caused more damage than the flooding did: practically all houses and buildings were destroyed and the population had to seek refuge elsewhere. As a result of the housing shortage a considerable proportion of the inhabitants have not so far returned. It is as yet impossible to gauge what effect this will have on the future of the polder and its population.

Recently the Minister of Waterways declared that owing to the condition of the country's finances an uninterrupted progress of the remaining reclamation plans is not to be expected. It is hoped, however, to make a start during 1950 with the third polder, the cost of which will amount to 180,000,000 guilders for the actual draining and a further 150,000,000 guilders for bringing the reclaimed lands under cultivation.

It will probably be another year before the last section of the North-East Polder is under crops, while erection of all the buildings and dwelling houses will take about eight years. Based on the present plans for allotting the land, some 250 farms and 500 dwellings are to be made available annually. Part of the polder will be allotted to farmers from Walcheren, for as a result of the wartime destruction of that island the layout of its farms had to be reorganized; a place in the polder will be reserved for some 150 families unable to obtain farms locally.

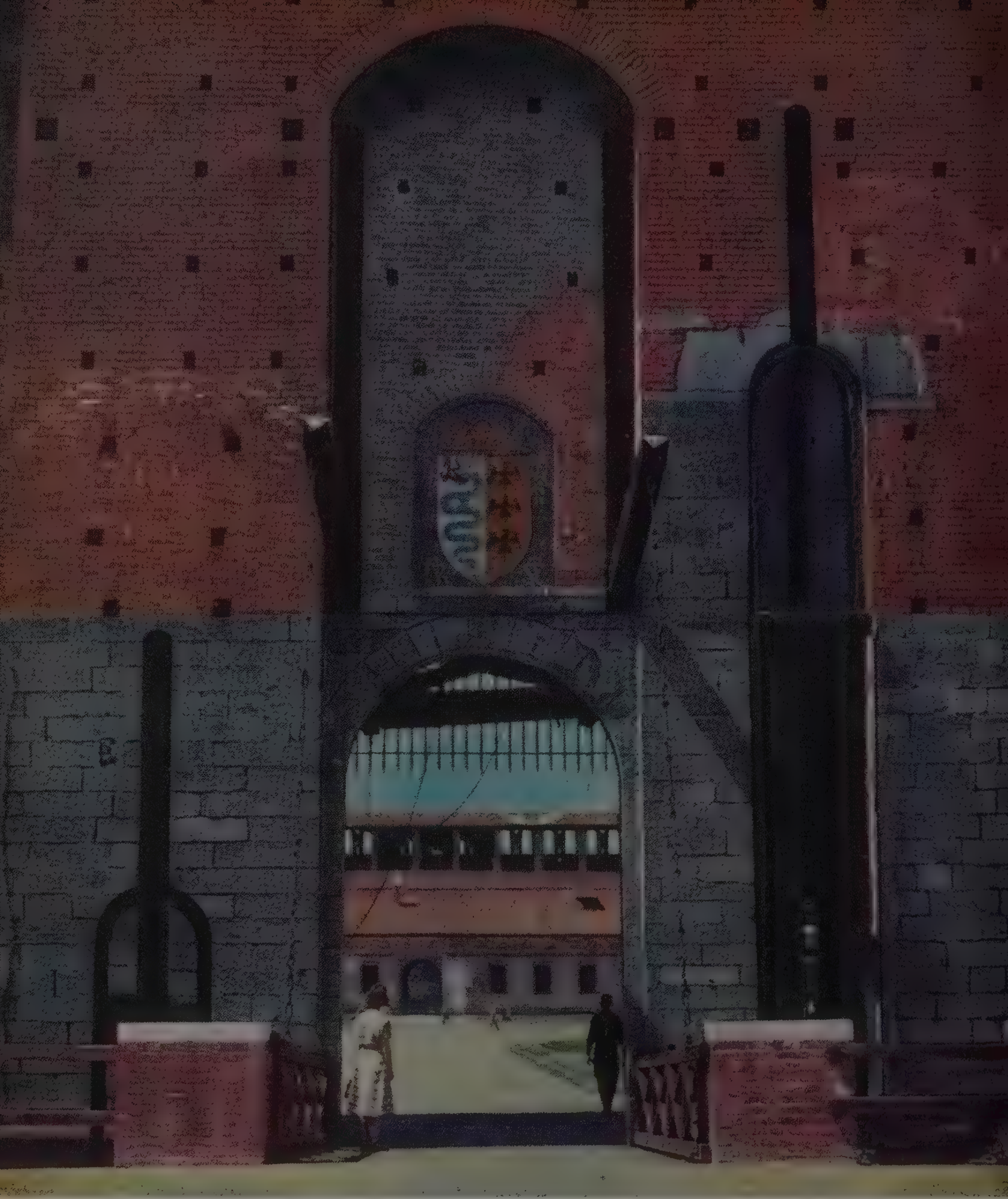
What assessment, finally, can be given of the project for closing and reclaiming the Zuiderzee? The Dutchman realizes that, owing to adverse conditions, it will be some considerable time before he can look back with satisfaction on the completion of this undertaking. The foreigner, on the other hand, tends to exaggerate its value to the population of Holland. It is estimated that the Zuiderzee lands will accommodate between 250,000 and 300,000 people. Considering that the net increase in the population of Holland during 1947 amounted to 173,231, the extra space provided on these polders is seen to be relatively small. The project should be regarded, rather, from a qualitative angle: that is to say, as the formation of a new community, drawn from the best elements of the Dutch people, from which valuable fresh ideas, methods and energies will emerge to the benefit of the country as a whole.



All Anscocolor photographs by W. Suschitzky

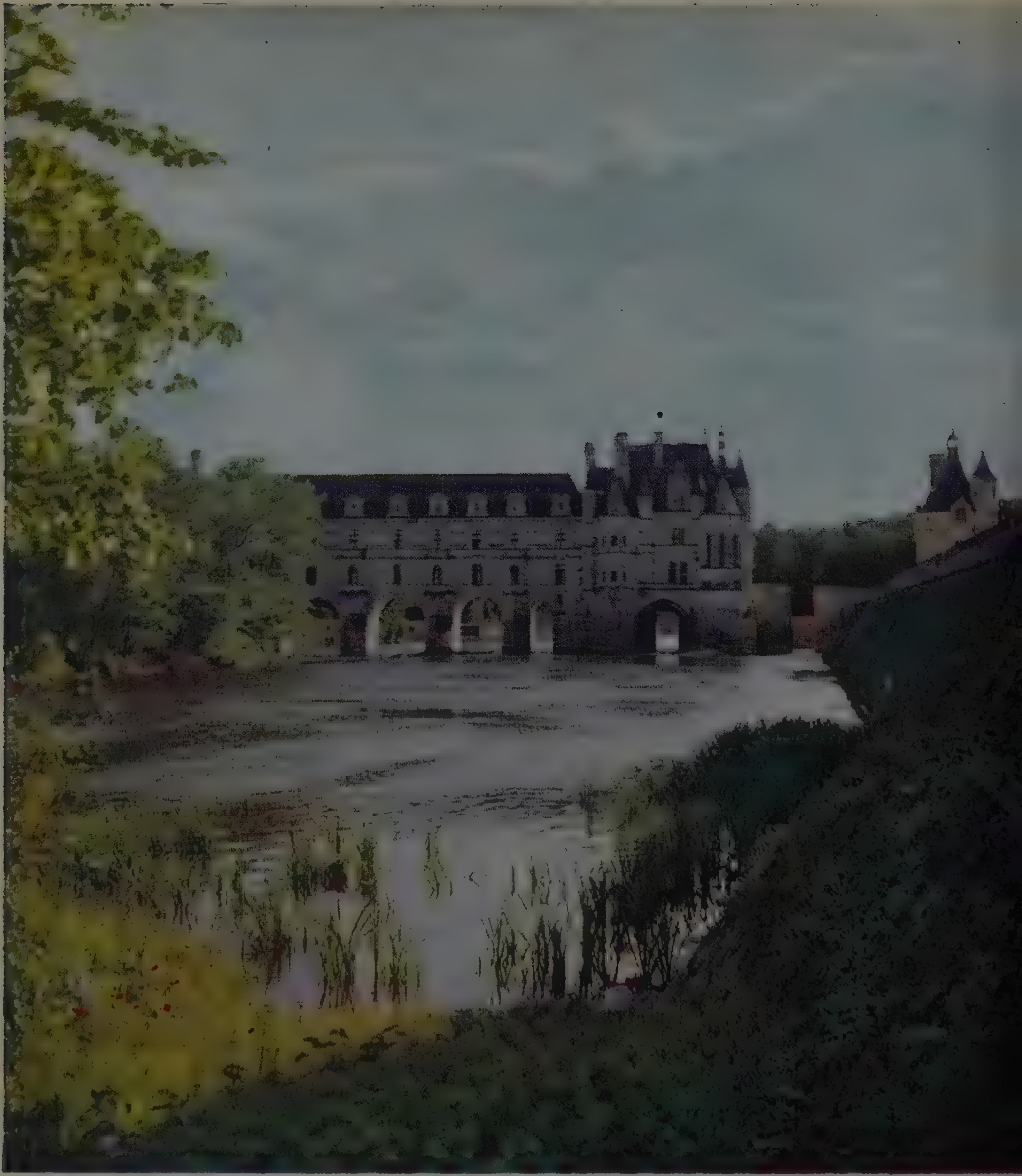
A Comparison of Castles. V

A view from the west of the great Sforza Castle in Milan, which has recently been restored to its 15th-century appearance. In 1450 Francesco Sforza, having seized power and become Duke of Milan, erected there a fortress-palace on the ruins of the 14th-century Visconti castle demolished by the populace in 1447. Until Francesco Maria Sforza's death in 1535, when the duchy was annexed to the Spanish monarchy, this tyrant stronghold and centre of intrigue was constantly taken and retaken during the struggle between France and the Empire for possession of Italy. In intervals of peace its defences were strengthened and its living quarters embellished, some of the rooms in the palace (now a museum and art-gallery) being painted by Leonardo da Vinci

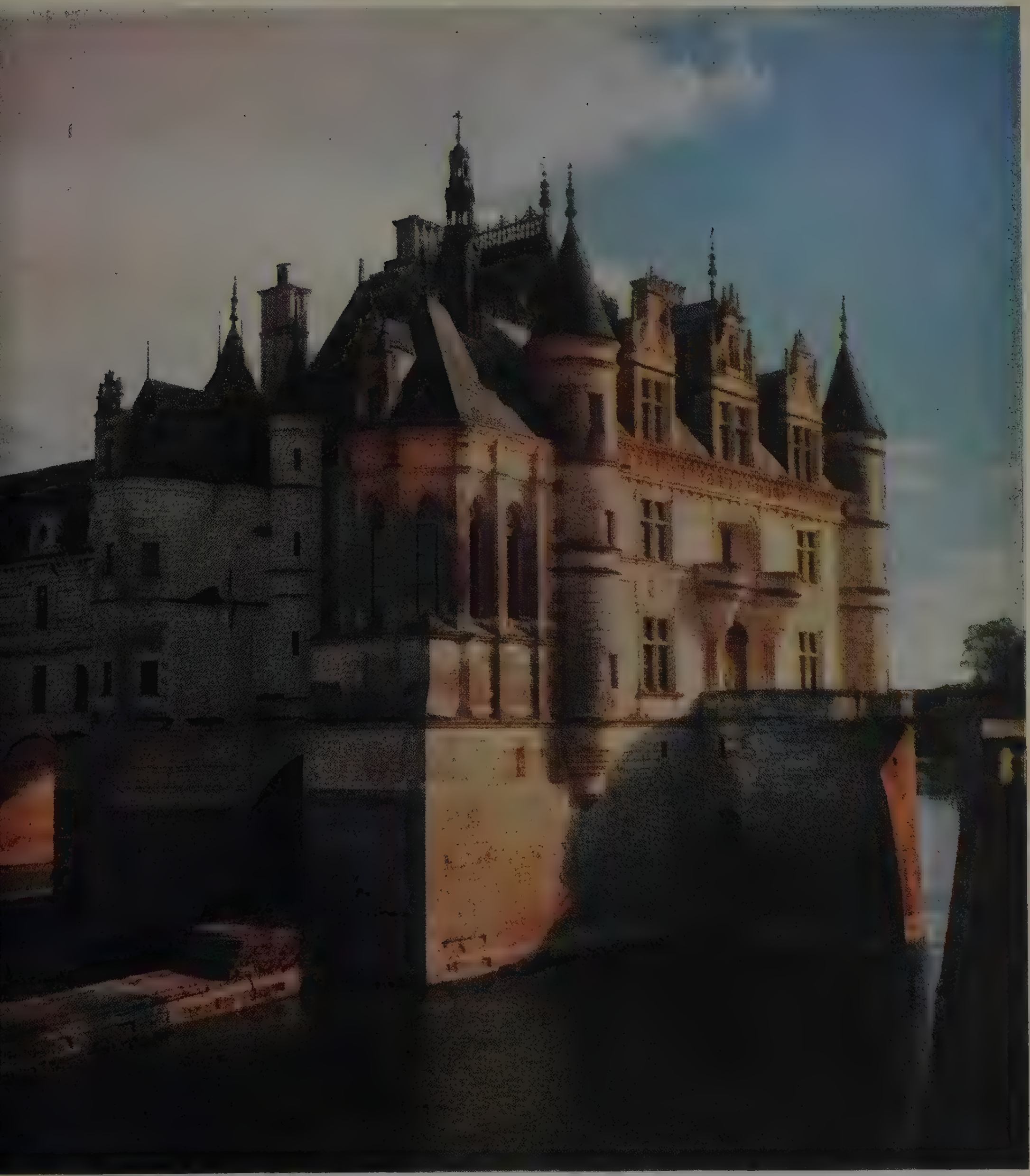


The eastern gateway, with drawbridge and portcullis, into the Castel Sforzesco, Milan. As in the case of many Italian fortresses of its time and earlier, it is laid out on the ancient Roman castrum *plan. But the quadrangle enclosed within its outer circuit of fortifications was divided into three separate courtyards by inner walls, ditches and buildings, which seriously impeded the battle manoeuvres of defending troops*

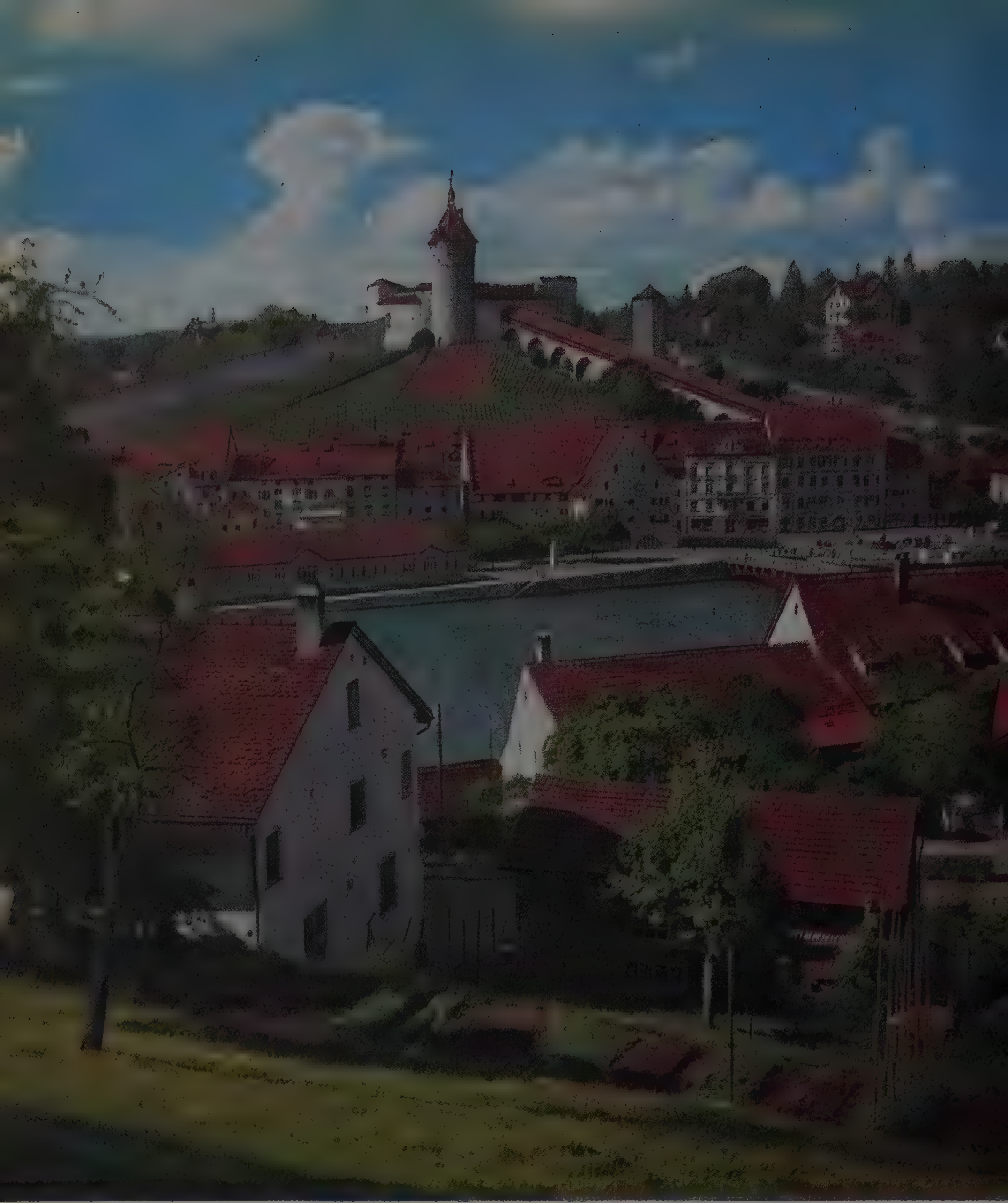
The approach to Chenonceaux, one of the loveliest of France's Loire Valley châteaux. By the 16th century a growing centralization of power in Western Europe, together with the rapid development of artillery, had rendered the baronial château fort *an anachronism; while the influence of the Italian Renaissance, laying primary stress on elegance and comfort, was gradually sweeping aside Mediaeval architectural traditions*



The château of Chenonceaux, seen from the east along the River Cher. The main pavillon (opposite) *was built from 1515-24 by Thomas Bohier, receiver-general in Normandy, who had returned from a trip in Italy filled with admiration for its gracious villas, details of which he attempted to emulate in the elaborate ornamentation of his sumptuous* château de plaisance. *In 1535 this was taken over by François I (himself a great builder of Loire—*

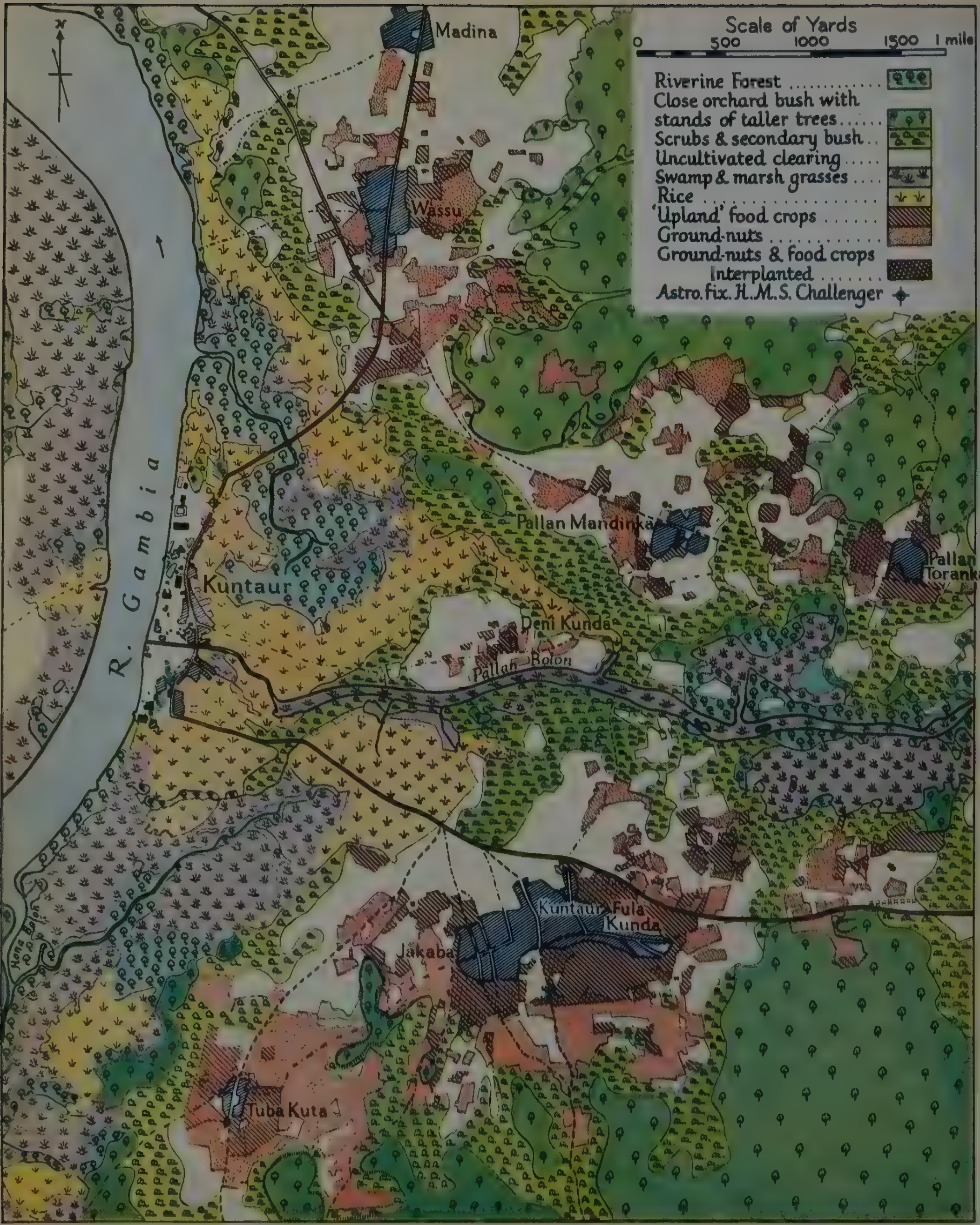


—châteaux) and after his death was given by Henri II to Diane de Poitiers, who had it linked with the farther side of the Cher by a five-arched bridge. Subsequently Catherine de Medici seized Chenonceaux, and under her direction a double row of galleries was built over the bridge. The interiors of these were decorated by Italian artists and filled with valuable Renaissance paintings, tapestries and furniture, much of which still remains



For social and political reasons, the building of forts became a state rather than an individual concern in the 16th century; and that erected above the Rhine at Schaffhausen to defend the northern point of Switzerland against invasion is a remarkable example of its period. Circular in form and strongly vaulted, der Munot *has low, thick walls designed to withstand gunfire. Artillery was mounted on the flat roof, ground floor and basement; and a spiral ramp within the donjon, or watch tower, facilitated the—*

—movement of gun-carriages. Three massive outlying bastions command the northern approach, while on the south side two defensive walls, the stronger of which is flanked by a square tower, radiate down to the river. Thus, with the emergence of an exclusively military architecture on one hand, and an entirely domestic form on the other, we reach the end of that long process of evolution in which they were combined—and throughout which the nobleman's castle was both his stronghold and his home



A Land Use map which was compiled by the geographers of the Oxford University Gambia expedition and drawn by the Royal Geographical Society, showing the pattern of agriculture in the Kuntaur area. The land is very flat, rising gently from the large wedge of swamp and paddy on either side of the Pallan Bolon (tidal creek) to the plateau which sometimes breaks off into small but definite bluffs. The astro-fix at the north of Kuntaur was made by H.M.S. Challenger *during her great voyage of scientific exploration around the world from 1872 to 1876*

Exploration in Gambia

by FRANCIS HUXLEY

That the world is still largely unexplored is true, among other reasons, because modern exploration requires that experts in a number of branches of science investigate simultaneously the same part of the earth, while hitherto few places have been thus investigated. One such is the part of the Gambia visited in 1948 by a team from the Oxford University Exploration Club led by Mr Huxley. The expedition received a substantial grant from The Geographical Magazine *Trust Fund*

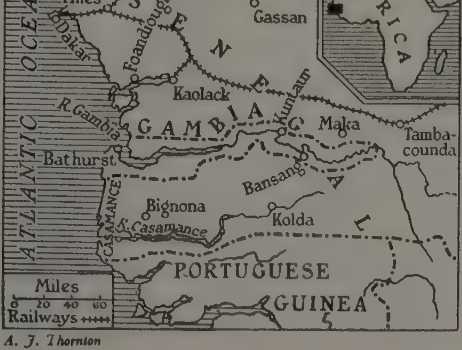
THE Gambia Protectorate is not quite such an arbitrary shape as it appears on the map. True, the frontier was marked out with ruler and compass, taking in ten kilometres of land on each side of the river; and these boundaries, especially near the coast, cut right across the elementary divisions of tribe and land. Gambia, that vermiform colony surrounded by politics, is also an untidy morsel for the administrator since its frontier is too long in proportion to its area; and, though it is assiduously spattered with French Customs posts, it cannot possibly be controlled. In some ways, this is all to the good. The Gambia River is like a small Nile, and the frontier, though arbitrarily drawn, takes in (especially to the east) a definite zone where agriculture can be successfully practised.

Gambia is also a waterway. Though somewhat neglected, its importance was recognized by the early Portuguese traders, and the British who came later annexed James Island (a small waterless island some ten miles up the estuary) as a miniature Gibraltar, later settling at Bathurst where they could more easily control the river. The trade, all in slaves, gold-dust, beeswax and ivory, opened up the overland routes to the north and east and gave rise to settlements on the river, as at Cassan (near Kuntaur) which were the ports and terminuses of the caravans. The country was divided up into a number of petty kingdoms continually at war among themselves, which raided for slaves and demanded tribute from passing traders. They eventually succumbed to Islam and to European commerce in the 19th century, by which time the British had captured the river trade.

Mungo Park, who visited Gambia at the turn of the 18th century, gave a description of the country which even now is superficially much the same: the villages mostly away from the river, surrounded by small areas of cleared land islanded in the bush; millets were cultivated as well as maize, sorghums, a little rice; many cattle were kept, and the work was done mostly by slaves who, Park said, made up over half the population.

The trading Europeans brought with them, as usual, guns, liquor, axes, cloth, which all helped to aggravate the political situation; and by the 18th century had introduced new food-crops, the most important of which was the groundnut from South America. With a growing demand for groundnut products in the world markets, the stage was set for the next development in the Gambian economy.

There is perhaps no other crop so well suited to the Gambian soil as the groundnut, and it can be grown throughout the savannah zone where the soil is light and the rains not too heavy. Besides being in demand for the making of margarine, it is a useful food, keeping well, making excellent stews, and tasting, when fresh, quite unlike the mummified peanuts one can buy at the zoo. From being primarily a domestic food-crop, the groundnut soon came to be the main source of wealth to be used when trading with the Europeans. Wealth originally had been in terms of cattle, which endowed their owners with prestige, as they still do; the country had no noticeable industries, and very few secondary goods surplus to its own immediate needs: none of these goods could be used in trading on a large scale. The Gambians started to grow groundnuts as a cash-crop, apparently on



A. J. Thornton

their own initiative; this began a minor famine, since the sale, and therefore the cultivation, of the nuts was all done by the men, who spared less time to work on their food-crops. There being not enough to eat, the women, so tradition has it, decided to grow rice on a big scale on their own; with such success that rice is now a staple food.

These three factors—the trading settlements on the banks of the river, the cultivation of groundnuts as an exportable cash-crop and of rice as a staple food—combined to encourage an increase in population, especially near the river where the most fertile soil is to be found. Some of the most interesting results of the work done by the Oxford University Gambia Expedition of 1948 came in assessing how important were these and other factors when related to the colony's capacity to produce food for its own inhabitants and for export; though we could only cover a limited area and apply in this the several capacities of the members of the expedition, who included four zoologists, three geographers, a botanist and a soil-chemist.

The area chosen, for various reasons, was that around Kuntaur. This is not a completely typical area; partly because it is a riverine community, especially favoured for rice-growing (it is one of the few places in the Gambia which are self-sufficient in food crops) and partly because Kuntaur is the main centre for the collection of groundnuts, the river ceasing to be navigable for ocean-going ships a short distance upstream. The villages are therefore liable to great fluctuations in population as the farmers come in to dispose of their produce and to buy European goods.

The pattern of agriculture throughout the colony is of course closely related to its topography and geology. The river is edged with alluvial flats, some overgrown with forest and mangrove, the rest covered with grasses and reeds, all flooded annually in the rains. Between them and the heights of the Senegambian plateau, about 120 feet above sea-level, is a belt of light sandy soil suitable for growing *koos* and groundnuts, and originally supporting a park savannah of a few tall trees, and long grasses which are easily cleared. The plateau itself—one jibs somewhat at giving such a name to this plain of hillocks—is a great area of sandstone capped with a hardpan of iron hydrate which gives it a characteristic redness. The soil is poor and shallow, supporting a monotonous and repetitive bush.

Settlement is most practical on the sandy belt between the flats and the plateau, since the upland crops—millets, sorghums, guinea-corn and maize, which all go under the generic name of koos—and the groundnut can all be cultivated there, and rice can be grown in the nearby swamps. This belt is in the Kuntaur region narrower than usual, so that the density of population is less than average for the Gambia.

The geographers of the expedition surveyed a large area round Kuntaur and the resulting map, reproduced on page 270, shows the distribution of cultivated and cleared land. Kuntaur itself lies on a ridge of land between the present bed of the river and a marshy crescent to the east, which represents an abandoned meander. Two *bolons*, or tidal creeks, to the north and south of Kuntaur indicate the course of this meander; the bolons themselves, which serve to flood and drain the swamps and the paddy fields (coloured grey and yellow respectively on the map) are surrounded by a riverine forest (viridian green). Beyond this low-lying area, which is all flooded at the height of the rains, is the more sandy belt where groundnuts and the 'upland' food-crops (brown) are grown. The proportion and extent of the brown, the white and the emerald green areas on the map give a good idea of the shifting cultivation practised by the Gambians. The white area represents land which, cleared but uncultivated, is lying fallow; the emerald green represents the scrub and secondary bush—the remains of the park savannah—which could be cleared if necessary. Beyond this belt lies the large area of close orchard bush (sage green) growing on the plateau, overlooking the semicircle of villages around Kuntaur.

Each village, surrounded by its fence of split bamboo, is made up of a number of compounds in the usual way, each compound of huts having close by its own small garden of maize, cassava, maybe a pawpaw tree, and perhaps some sugar-cane, sweet potatoes or yams. Around the village are the koos fields, often interplanted with groundnuts. These 'volunteer' nuts are harvested when they are still milky and tender, earlier than the main crop which is planted further afield. Unlike some of the koos fields, which are kept under a continual rotation of crops, the groundnut fields are farmed until they begin to fail, when they are abandoned and a new clearing is made in the bush.

Strictly speaking, there is no upland rice in the Gambia. All rice is wet rice needing to be flooded at some time during its life. The land used is that which is just higher than the

John Clarke

John Clarke

(Above) *Bush near the Senegal border. Most of the Gambia is extremely flat, and the normal vegetation is a monotonous sequence of close orchard bush and a more open scrub. The large trees are mainly a species of acacia with the occasional mahogany, silk-cotton tree, and locust bean. Here in the bush north of Kuntaur, there are but a few villages. The soil is too poor to make agriculture at all easy, while the game which must once have been plentiful has been killed off and only part-replaced by cattle.* (Left) *Palm trees—the common types being the black rhun palm (from which palm wine is made) and the oil palm—grow in stands along the river banks and in the woodland belt on the coast*

John Clarke

The women, having already done the work of clearing the swamps for rice-planting, now transplant the young rice from the dry nurseries to the paddy which has been well flooded by copious rain

spring tides, but well covered at the height of the wet season by rain and river water. Such land, which can be farmed year after year without rotation or lying fallow, is to be found along the river banks and on each side of the bolons; as a result, farmers in some of the villages which grow rice must travel well over a mile to get to their paddy-fields.

The land should be cleared and the crops planted at the beginning of the rains, when the earth has lost something of its cement-like hardness; and the work of hoeing and weeding goes on until the harvest. The rice is put out into small dry nurseries and is transplanted sometime in July into the flooded swamps. This is the programme which the Gambians try to carry out, but it is easily interfered with; the rains may be insufficient or too late so that the ground can only be dug with great difficulty; the rains may be too heavy and wash out the planted crops, or encourage the naturally prolific growth of weeds. All this means a great deal of work, and especially in the rice-fields the time-table cannot be adhered to. We saw swamp clearance still going on in August, while some of the groundnut fields had only recently been planted.

The difficulty of timing one's work with the rains is partly overcome by cooperation. The village headman and the provincial chief or Seyfu can demand that their fields be cleared or weeded by the men of their villages, and the villagers often band together for work on their own farms. The tool used on these occasions is a cross between a small spade and a trowel which is held by a kind of pistol-grip at the end and is wielded in terrifying but expert jabs and slashes. Food is usually provided by the owner of the field, who may also hire a band for the occasion if he can, a band of drummers, singers, and players of native xylophones and stringed instruments. The music these bands produce is spirited and creditable, and the labourers are certainly stirred to ecstasies of speed during the more vigorous passages. Women late in transplanting their rice use the same methods, and parties of women (some carrying their babies on their backs while they work) holding a bunch of young rice in one hand and a split stick in the other, work in lines dibbling the plants deep into the mud. Over the paddy-fields the noise of these little parties reminds one of an unusually cheerful open-air production of Shakespeare, or an Easter fair on some distant Hampstead Heath.

Every year there is an influx of strange farmers from Senegal and Casamance to till the comparatively fertile soil of the Gambia. In return for their board and lodging these farmers, having received permission from the village elders, spend a certain number of days every week working on the farms of their hosts. In the Kuntaur district they had to give four days a week; this was unusually heavy, two or three days being the normal portion required, but the conditions were willingly complied with owing to the extremely good opportunities they had for selling their groundnuts at a fair price without transport costs or difficulties, and to the great variety of goods that they were able to buy at Kuntaur. This arrangement suited all parties; the strange farmer returning with a profit, and the Gambian host having obtained valuable extra labour at little cost. There is plenty of land available so no one is the worse for it except perhaps the government, which sees in the strange farmer a taxable unit disappearing untaxed into French territory.

The gradual opening up of the country by trade has led to one serious and unforeseen consequence. The population has settled itself near the river which is the natural habitat of mosquitoes and tsetse flies, while the paddy-swamps in which the women work are full of the snails which carry schistosomiasis. The figures for malaria, sleeping sickness and schistosomiasis are among the highest in Africa, and these diseases are spread about the country by traders and strange farmers. There is a first-class hospital at Bansang, to which patients from all over Senegal and the Guineas come, and several villages have native dispensers; but without adequate protective measures there is little that can be done.

The chances of infection are made much greater by the annual occurrence of the hungry season, which lowers still further the resistance of the Gambian native. The hungry season comes when there is not enough of last year's food crop left to satisfy hunger, and the new crop is still in the ground: while the unbalanced nature of the nearly universal cereal diet is an aggravating factor. Cows are seldom killed, only their milk being habitually used; fruit and vegetables are very scarce. The growing of groundnuts as a cash-crop must also be blamed, since the money the African gets for them is (to our standards) improvidently spent. The outcome of all this is that the Gambians have least energy just at that time when they need most, during the arduous period of clearing the land, planting and weeding the crops, and are not able or willing to do the extra work which would

Eric Gordon

By August, the groundnuts have begun to ripen, and the fields need constant weeding. A number of men from the same village work together, encouraged by drummers who are hired for the occasion save them from the next hungry season.

Harvesting starts in August with the early guinea-corn and maize and ends in December with the rice. This succession of harvests means that from July onwards a continual watch must be kept against marauders, in the form of monkeys, baboons, birds and hippopotamuses. All of these do very well out of their pillage except for the hippo, which is dying out. The problem of saving the hippo from itself by keeping it out of the rice-fields and out of range of firearms had been originally suggested to us by Sir Andrew Wright, the Governor of the Gambia, as one which an expedition like ours could reasonably tackle.

We had difficulty in finding any hippos at all. The river had once been full of them—though not so full as a twenty-mile stretch of the Nile in which Pitman saw 2500; they had diminished in numbers by 1940 when there were only three hundred left; fifty-three had been killed by one man in 1947; and when we were there, although always on the lookout, we saw but twelve animals in all.

It is difficult to know how far one is justified in protecting animals which, however romantic and spectacular they may be to the traveller, give so much trouble to the native. In one night a hippo can eat an amount of rice which, if left to ripen, would have fed a family of five for a week, while its progress through a paddy-field is like that of a garden roller with boots on. Thus, though the number of hippos is small, their capacity to despoil a rice-field is such that many villages situated near the river will not grow rice on what are the best rice-lands which have been found to be peculiarly liable to attack. Hippos are therefore shot as much as possible, being anyhow esteemed for their flesh (it tastes like an anonymous piece of beef); and various other attempts are made to stop them from doing damage. But it is hard to resist a determined hippo. They come out of the river at places where, by continual entrances and exits, the bank has been worn away into the semblance of a railway cutting. The Gambians do what they can with timbers to block these slides and to keep the banks vertical, and erect sapling fences around their plots. We were told that these fences were sufficient to make the hippos shy away, since they do not like having their noses touched; we disbelieved this after seeing the tracks of a hippo which had walked in a straight line from the river to the Senegal frontier and back, through the most varied and unpleasant forms of bush. We also saw what we believed were scare-hippos, till we were told they were against the rice-birds, the hippo seldom feeding before nightfall.

The only efficient way to protect the hippo would be to create a game reserve. Indeed, this is perhaps the only practical way of keeping from extinction large animals which compete with man on such a noticeable scale. In Gambia this is impossible. The Gambian economy has led to the disappearance of most of the country's large game: the elephant, once plentiful and still the crest of the Gambia; the giraffe; and many species of antelope and duiker. And while what one might call the useful animals are dying out (useful since they can be eaten) the pests are increasing. Leopards are killed whenever possible for their skins, so that their natural prey, baboons and monkeys, live without any check on their numbers. Unfortunately, neither the baboons nor the monkeys are considered good to eat by the Gambians; and though the government regularly issues gunpowder for baboon hunts, the farmers prefer to use it on some animal which can be eaten. There are really a frightening number of baboons in the Gambia, sometimes, we thought, almost equalling the human population. At night, the trees along the river would carry families of them in festoons, while one could see large troupes of them inland, barking authoritatively and giving convincing displays of mock heroics. We were not surprised to learn that in some years they would destroy nearly half of the total groundnut crop of the country.

In addition there are the rice-birds—the weavers, finches and waxbills—and the pigeons, which raid the cereals and the rice once they come into ear. Young boys spend much of their time in shelters in the fields, shouting, throwing stones, cracking whips, and jangling systems of tin cans to scare away the birds. But the birds take little notice of the noise and the damage they do is extremely severe, especially to maize which as a result is never grown in fields but is only a garden crop.

There is little doubt that the misfortunes of the Gambia are exaggerated by a primitive and inefficient economy. The division of labour is harder on the women, who have to undertake the laborious task of clearing the paddy; though the men, who very naturally are prejudiced against doing what they think is intrinsically women's work, are now occasionally seen to lend them a hand. Digging and land-clearance is done with a hoe, since there are no native ploughs; harvesting is accomplished with a knife: the Government did once distribute scythes which the Gam-

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The River Gambia serves as a waterway. The groundnut crop, harvested at the end of the rains, is collected at centres along the river such as this one at Carroll's Wharf. Here the groundnuts are transferred by barge onto the ocean-going cargo ships, which come upstream as far as Kuntaur

bians used till they discovered that the faster the rice was cut, the faster it was eaten.

There are hopes that this state of affairs can be improved. It is possible that in the Kuntaur area the paddy can be developed and more rice grown by extending the bunds—the small dykes which hold the water on the fields—and by controlling the irrigation, so that there would be less dependence on an irregular rainfall. For example, there would evidently be room for an extension of the rice-growing areas (marked yellow) into those now occupied by swamp and marsh grasses (grey). The riverine forest, however, which looks so inviting on the map, is too thick and tangled for any native to wish to clear it. (It is also, according to my informants, the home of the fabulous *ninki-nanka*, which it is death to see and death to be seen by; and which, since no solid proof of its existence can be given, is all the more deeply feared.) Groundnut cultivation could be mechanized once a few Gambians have been taught to understand machinery, which they otherwise treat with a blind abandon; and it may be necessary to do away with small plots and shifting cultivation.

Such matters as these, however, are for political and administrative decision. All our expedition could do was to contribute towards a balanced assessment of the many factors (some of which I have outlined above) linking the Gambia's difficulties with its environment; and we are very glad to have the Governor's assurance that our contribution is of some value.

Dancers of the Golden Age

by DR VERRIER ELWIN

Dr Elwin has been engaged in research and welfare work among the tribesmen of east-central India for many years and has written a number of books about them. He is a member of the Tribal Art Research Unit, which is concerned with the cultural life of aboriginal India and South-East Asia

THE classical ballet of India has been exhibited in splendid performances to audiences in Europe and America. Few people, however, have had the opportunity of witnessing the dances which, throughout tribal India, revive in a modern setting something of the zest, the rhythm, the intricacy of pattern and the delight of the golden age.

During the past twenty years I have watched hundreds of these dances, generally in places rarely visited by strangers; their variety has been endless, their quality nearly always high, their value for those who enjoy them of the first importance. The pictures that follow come from the isolated but entrancing hills of Bastar and Orissa, inhabited by a virile and charming people. They include the Saoras, a tribe noted for the perfection of its terraced cultivation and the complexity of its religion. Not far from the Saoras live the gentle and inoffensive Gadabas, and to the north, in what used to be the Orissa States, there may still be found a few Juangs, famous for their leaf-dress. The Konds, once notorious for their human sacrifices, live in the same area. To the west of Orissa is Bastar, formerly a State the size of Belgium but now part of the Central Provinces, whose population may be broadly divided into the northern Murias, a tribe about a hundred thousand strong, whose life centres round the *ghotul*, the village dormitory which organizes its boys and girls into a remarkable synthesis of work and recreation, and the 'Bison-horn Marias', so called on account of the superb head-dress which they wear for their wedding-dances.

These tribesmen dance whenever the season or their loves invite; give them a bright moon and a little liquor and their feet begin to move unbidden and their hands stray towards the drums.

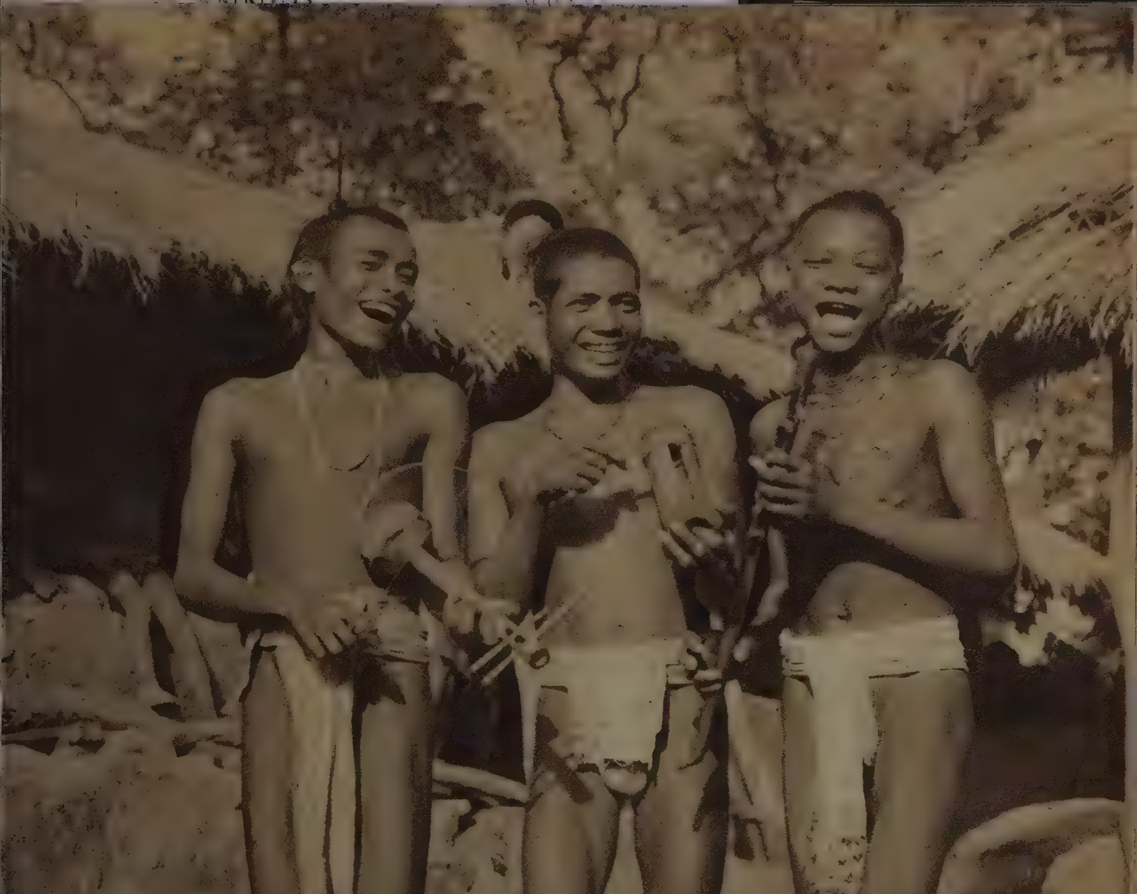
> The dancers are dancing, the people gather round O!
> How lovely are the feet adorned with silver;
> How beautiful the anklets with their sounding rings.
> The dancers are dancing, the people gather round O!

The most splendid of the dances is the wedding-dance of the Bison-horn Marias. The men, in their magnificent head-dress and carrying their long drums, move in a large circle with a great variety of turns and changes; the 'bison' charge and fight each other, pick up rings or leaves on the points of their horns, and chase the girl-dancers. The girls, each with a dancing-stick in her right hand, form a long line and go round and through the group of drummers. Masked mummers, clowns dressed in straw and naked acrobats add to the gaiety of the scene. There is no finer dance in India.

Muria dancing is also of great merit. It falls into two sharply contrasted styles. The older type, which derives from the Marias of the Abujhmar Mountains, is solemn and impressive: the boys decorate themselves elaborately; parties of boys and girls assemble from a score of villages for a festival and dance all night. When four or five hundred dancers spread themselves over a great field, and move round to the light of torches, the blowing of hunting horns, the clang of bells, the waving of innumerable plumes, the earth itself seems to come alive. And it goes on and on till one is intoxicated by the gentle rhythm, and by dawn even the outsider can appreciate the ecstasy and delight of the boys and girls who can dance untired for hours before their gods.

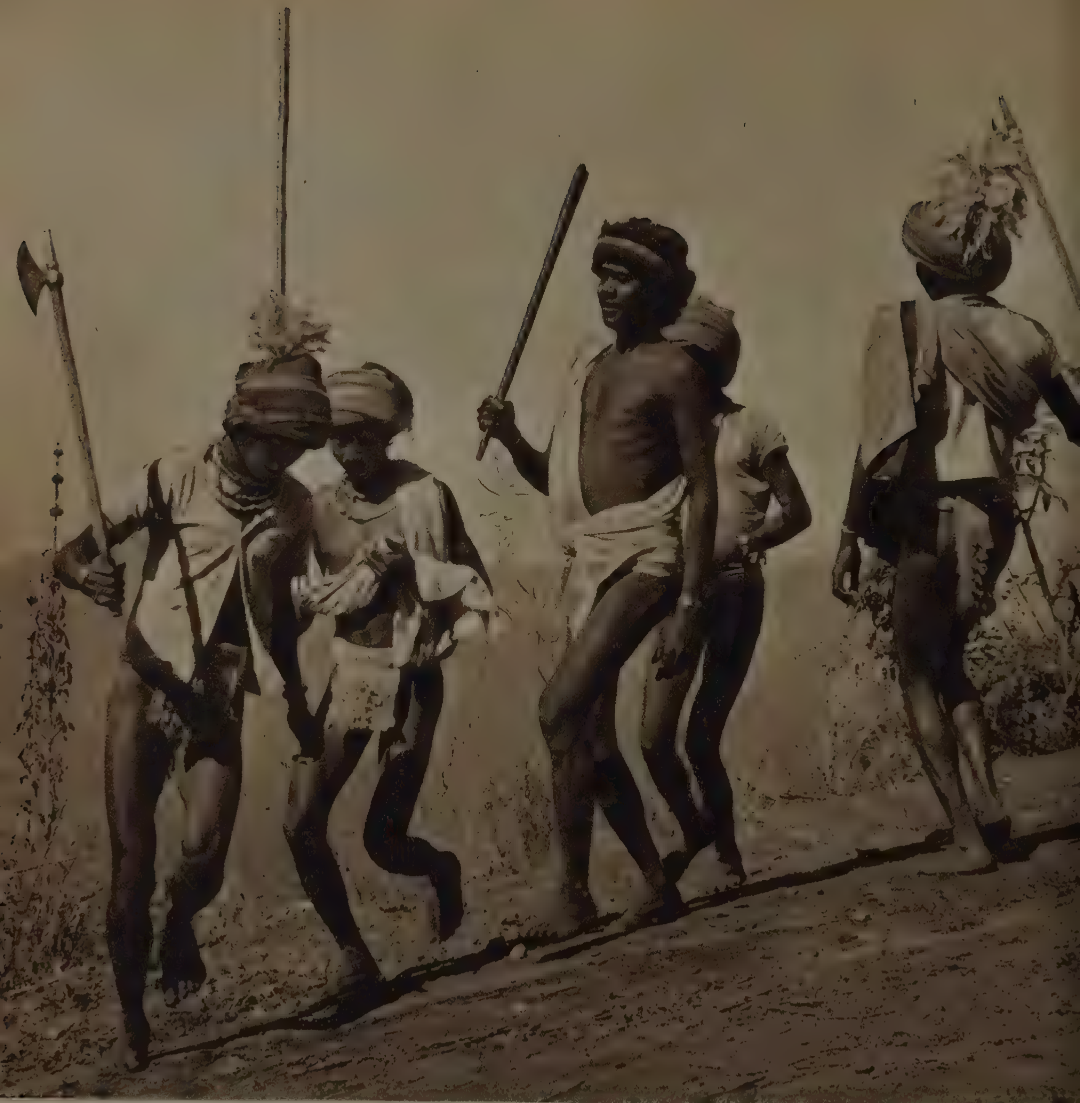
In the east and centre, however, the Muria dances are more lively and show greater variety. Many of them are hardly distinguishable from games; boys and girls imitate the movements of birds, the wriggling of snakes, rice-husking, drawing water, tethering buffaloes.

The Gadabas approach the Murias in the excellence and variety of their dance. They too imitate the tasks of field and home—



D. V Sassoon

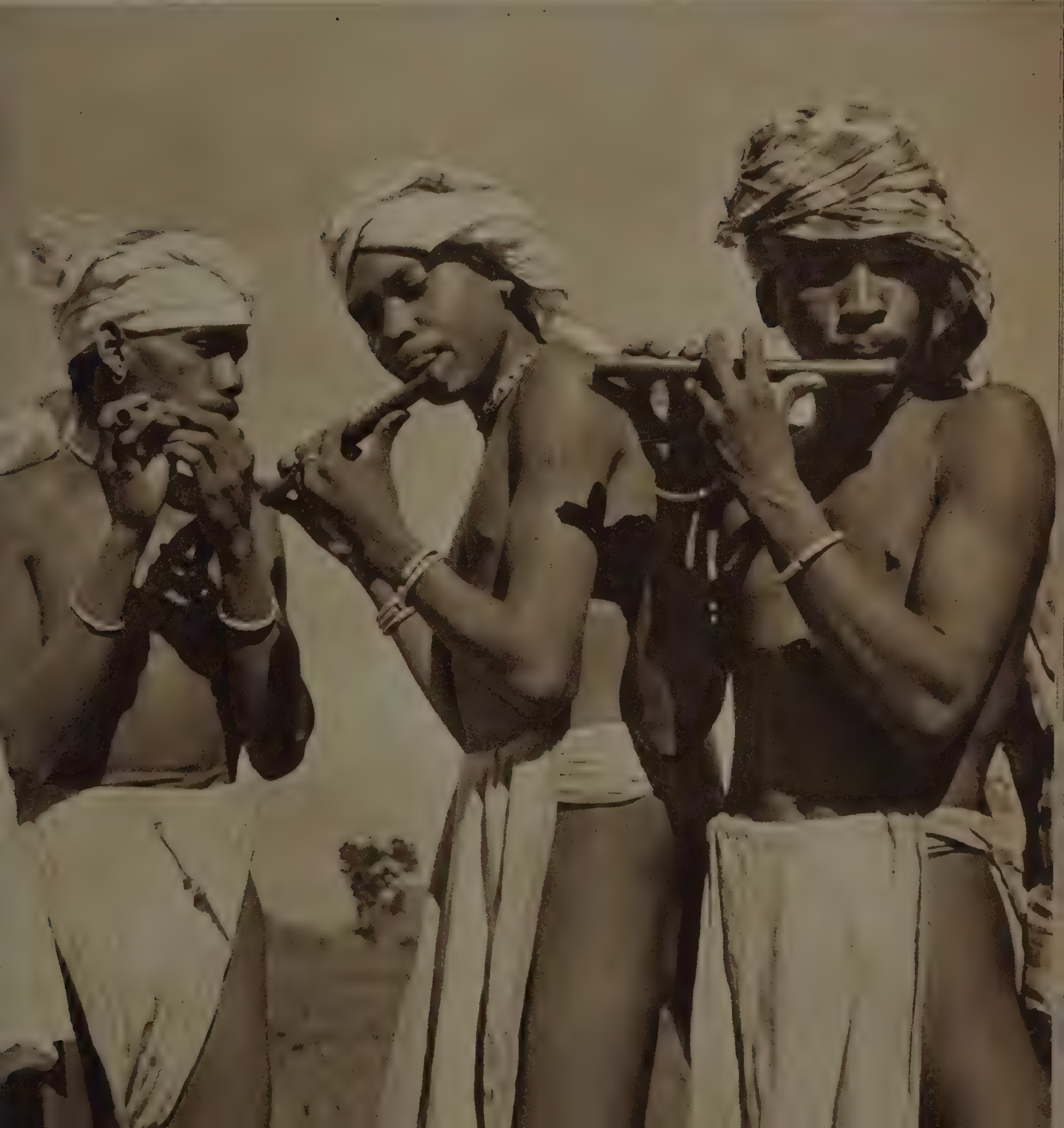
Saora boys dancing in the street of Tumulu, a village in the Ganjam District of Orissa. Their instruments are of the crudest kind, one of them being a 'musical rasp', a serrated bamboo which is scraped with a bit of wood

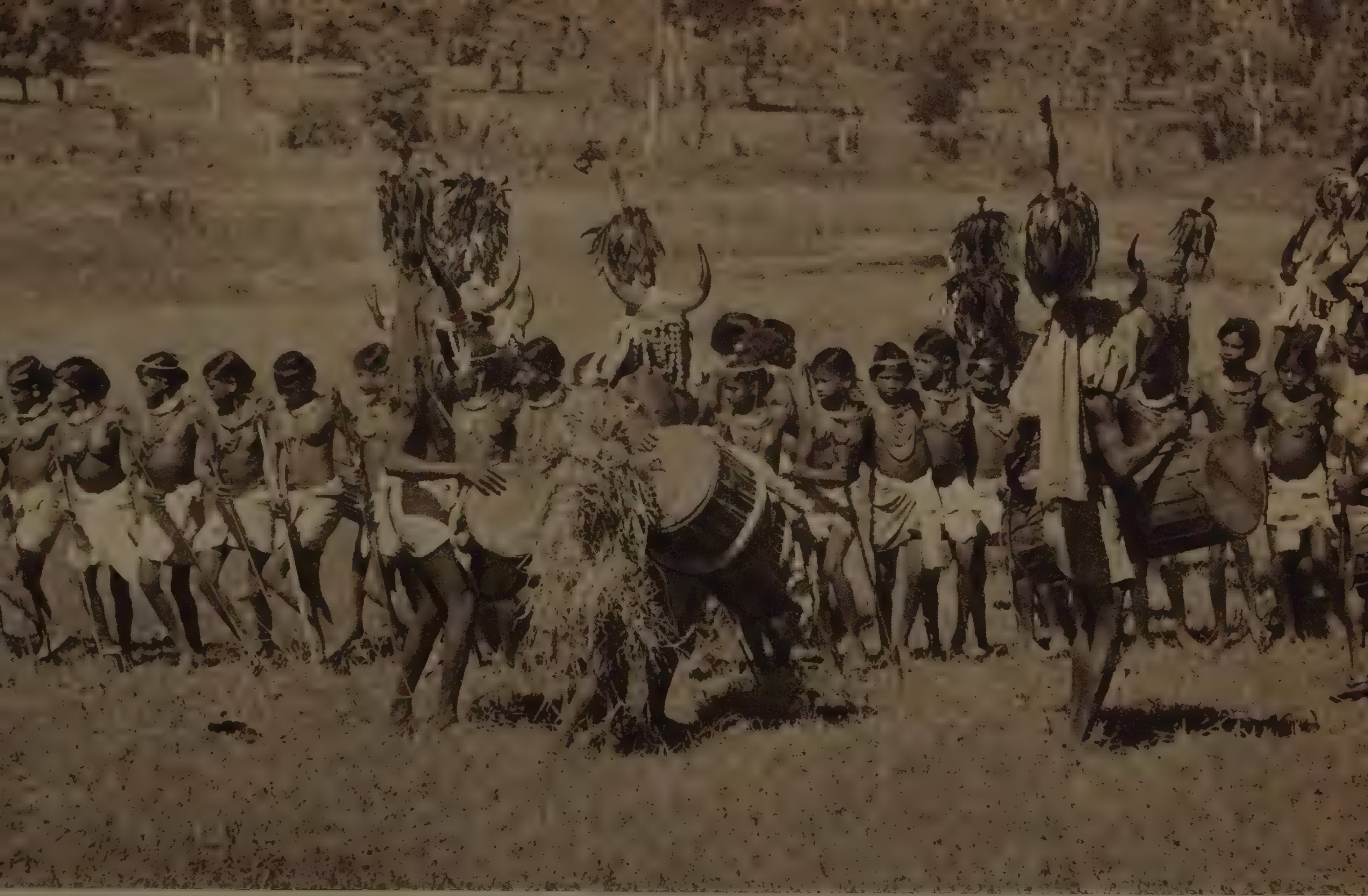


photographs, except one, by the author

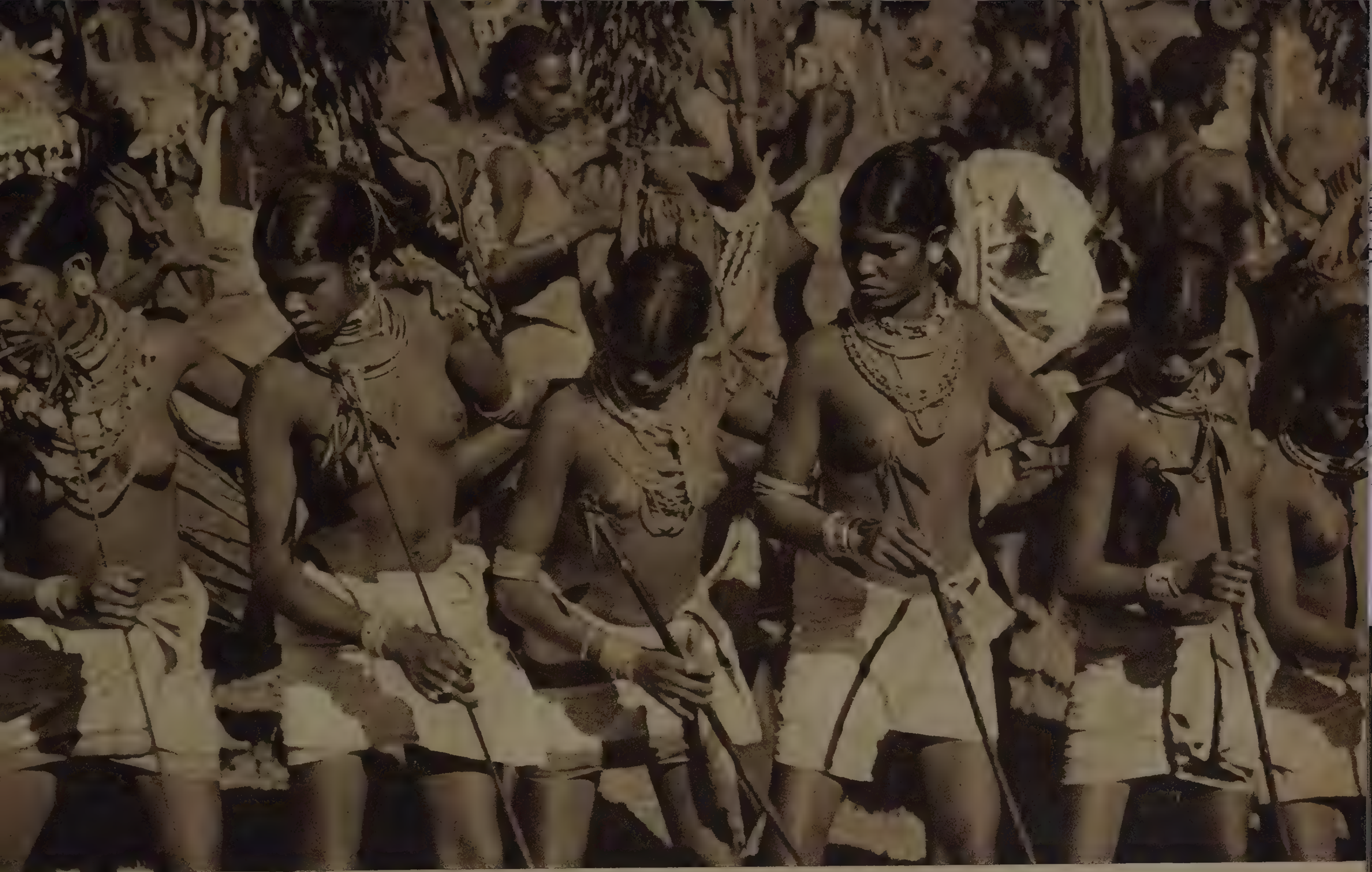
Saoras dancing down a hill-side. Gaily decorated with coloured cloth and tufts of white feathers in their turbans, the Saoras dance in procession round their villages and fields on most occasions of ceremony

Muria flute-players in Bastar, accompanying a dance of girls at a wedding. The Muria flute, which is only capable of a limited scale, has five stops. Boys play it while watching cattle or guarding crops at night

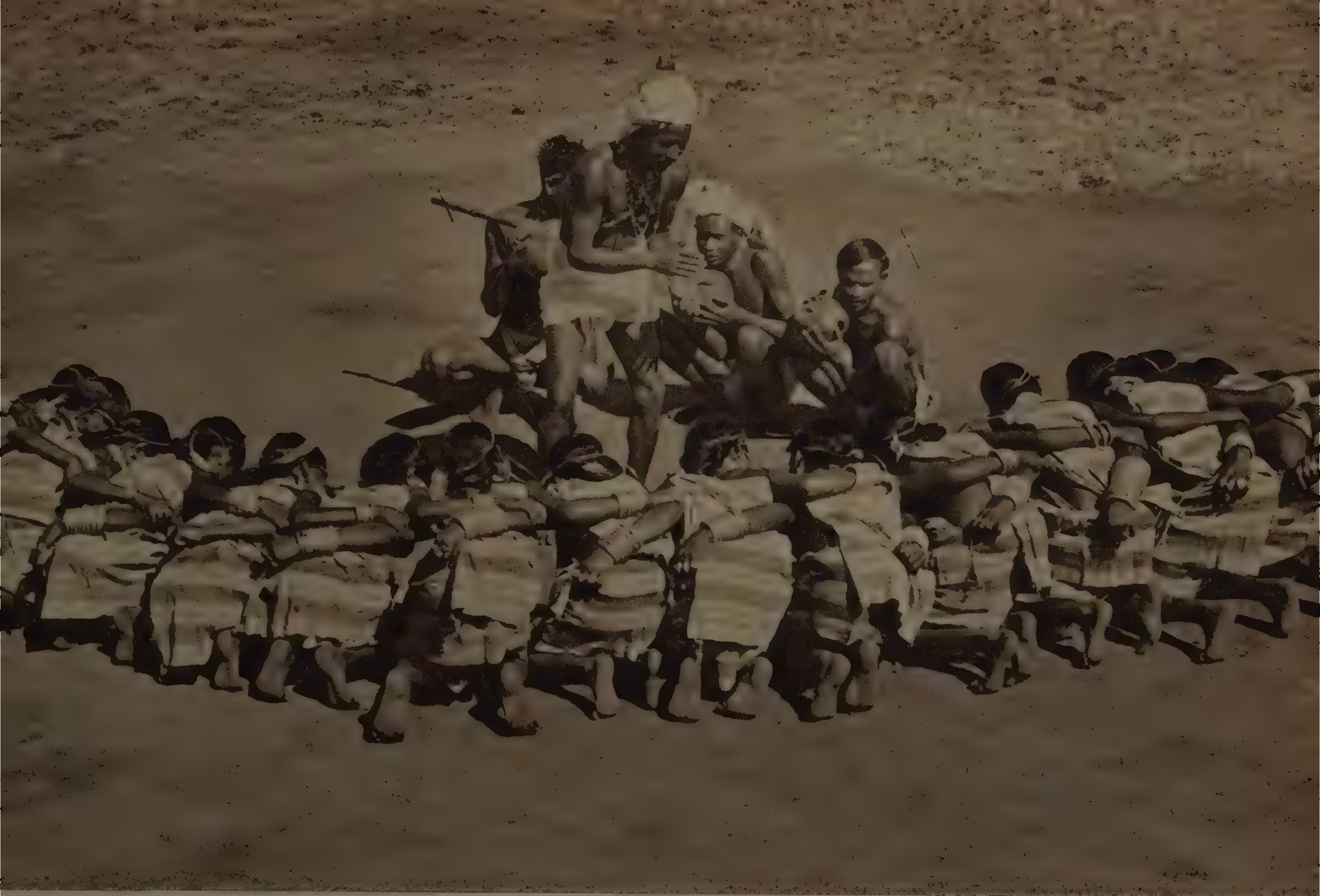




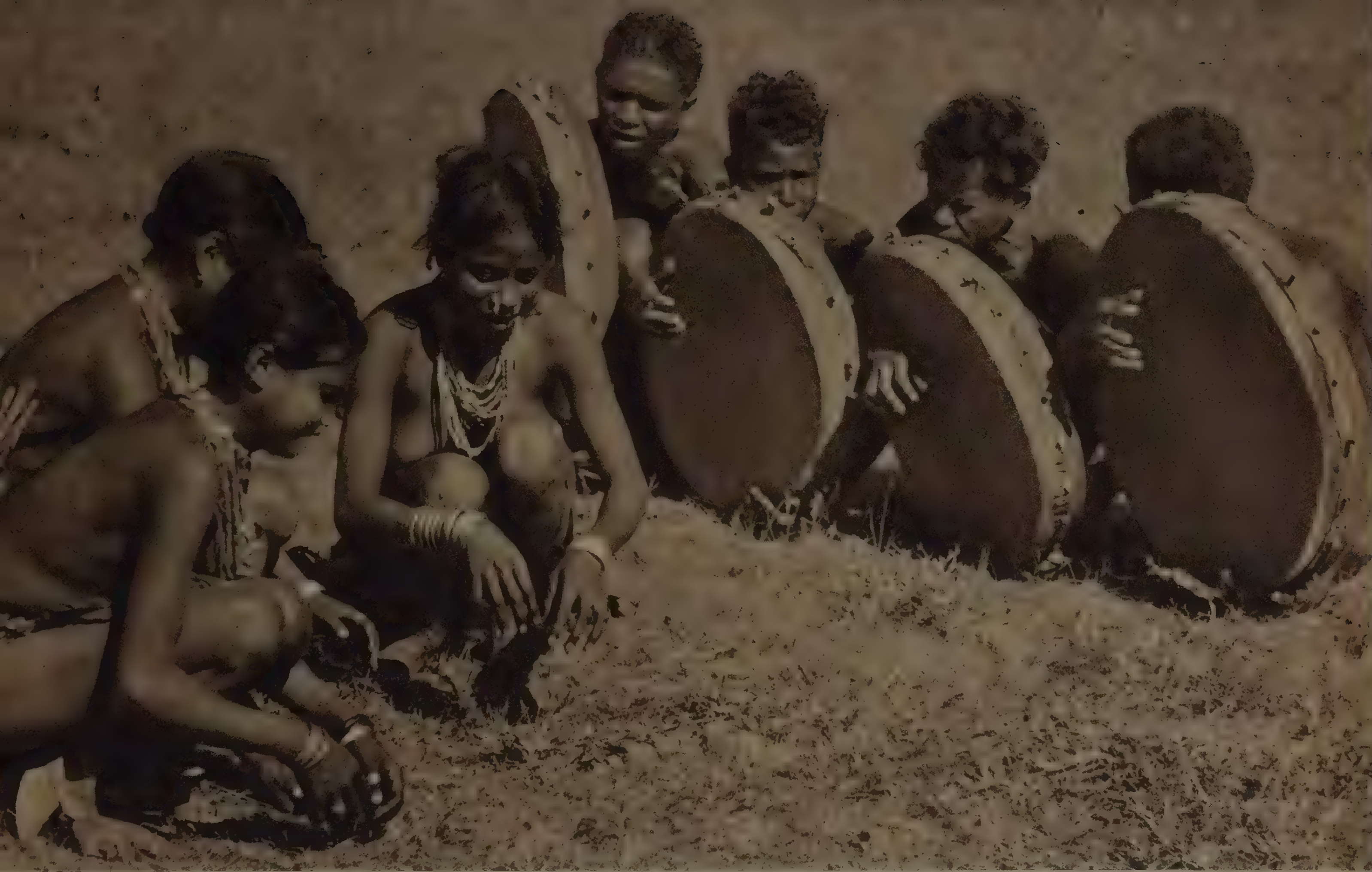
The Muria wedding-dance. This superb parade of men and women dancers is an essential feature of every Bison-horn Maria wedding in southern Bastar. Bride and bridegroom must dance with their friends, and—



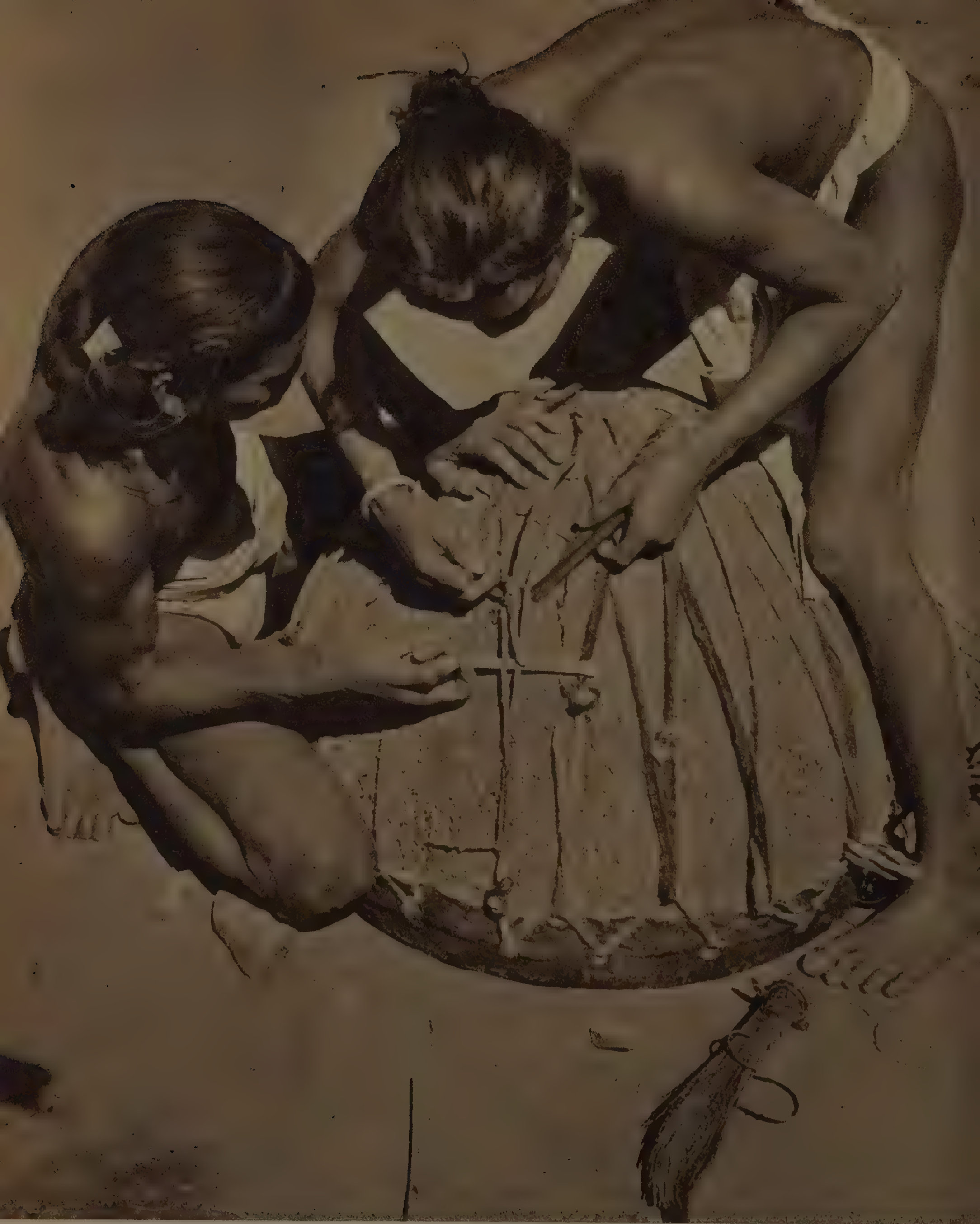
—the bride has to wear a cloth completely covering her head and body. In a pause during the dance the bridegroom seizes his bride and drags her triumphantly away to a small hut set aside for the purpose



Gadaba dance at Thal Duraly in Orissa. The Gadabas are among the most practised dancers in Middle



The quail dance of the Juangs. The men, in line, beat gently on their enormous tambourines, while the girls imitate the movements of the quail. Here the 'birds' are picking up their food from the ground



Kuttia Kond boys mend a drum in a remote village in the Ganjam hills. The drum has a semi-sacred character in this part of India and it is worshipped before use and carefully tended, for the breaking of a drum is unlucky carrying water-pots, cleaning the ground, tilling with the hoe—and the men perform elaborate exercises with sticks. And there is a great dance where a long line of girls circles round the musicians, now on their knees, now bending low, now moving rapidly upright.

When Colonel Dalton first saw the dance of the leaf-clad Juangs nearly ninety years ago, he was struck by "the wild weird sight" it presented. "The men sang as they danced, accompanying themselves on deep-sounding tambourines; the girls holding together and circling round them in a solemnly grotesque manner." But he also saw a more lively performance, a ballet which imitated the movements of birds and animals. There was the bear dance and the vulture dance, when someone lay down as a corpse which the dancers nipped and pinched. "The pigeon dance followed: the action of a love-making pigeon when he struts, pouts, sticks out his breast, and scrapes the ground with his wings was well imitated, the hands of the girls doing duty as wings." There was also a quail dance in which the girls "squatted and pecked at the ground after the fashion of those birds".

The Saora dance has been influenced by the physical conditions of the countryside. Saora villages are built in long streets, which often rise above each other up a hillside. There is no dancing-ground or flat convenient space where a dance can be elaborated into intricate movements. The Saoras therefore have developed a procession instead of a round, and they move up and down their narrow streets and across their terraced fields with little order and rhythm but with great enthusiasm and noise.

A great and famous dance performed all over Middle India is the "Karma", which symbolizes the bringing of green branches from the forest in the spring. Some of the Murias, many Gonds, the Baigas and other tribes of the Central Provinces and Orissa know this dance, and some of them keep an actual festival of the *karma* (or *karam*) tree, planting its boughs in their villages and dancing round them. The dance is, in fact, filled with the breath of trees. The men leap forward to a rapid roll of drums—a gust of wind which blows back the swaying forms of the women. Then, bending low to the ground, the women dance, their feet moving in perfect rhythm to and fro, until the group of men advances towards them, like the steady urge of wind coming and going among the tree-tops, and the girls swing to and fro in answer. The song is the cry of a thousand living trees, the music of the drums the steady beat of the moving branches. They dance throughout the night, men and women rivalling each other in the improvisation of their songs until they are lost in a perfect rapture of movement.

And all the time they are singing, making a living poetry that is never written down, but is recreated day by day in the very spirit of delight, sung under the bright moon or in the glow of a great log fire, to the crash of drums, the music of anklet and bangle, and delicate movements of the feet. A girl dancer is compared to a lovely tree moving to the unseen power of nature and a tribal riddle asks: "What is the dumb bird that sits on a beautiful tree, but which awakes and sings when the tree is shaken?" The answer is: "The anklet on the foot of a girl who goes to dance."

One of the accompanying pictures shows boys at work mending a broken drum. It is generally supposed to be unlucky, a sign of supernatural displeasure, for a drum to break. Drums are sacred and various rules and taboos are connected with their manufacture. Before a Muria youth cuts down the tree from the wood of which he will fashion his drum, he offers an egg before it and prays: "May this drum give a good sound, and may we learn every kind of step and rhythm; may we have no sorrow and may our songs be good." Often this prayer is addressed to the Thunder God, for he who gives thunder in heaven is the best person to promote the thunder of the drums on earth. The hide which is used for the face or faces of the drum should, if possible, come from an animal which has been killed by a tiger, for it will then roar as a tiger roars. And it should be stretched on the drum at the season when the frogs are croaking loudly. When the drum is ready and is first used, there is a special ceremony; and indeed at most festivals or marriages, before the dance begins, the drums are piled up and are worshipped.

There are many riddles about drums. A drum is "the thing which growls at the least touch". It is "a brown cow that lows in the middle of a field". It is "the orphan boy with a big belly that cries all night". It is "the bird with no teeth that cries *tihito*". It is "the elephant's stomach, in which there buzzes a fly".

The dance is of enormous importance, quite apart from its value for art and music, to the morale and well-being of the tribesmen. The romance and gaiety of primitive life is essential for its preservation. The tribe that dances does not die; it has a refuge from the degrading effect of boredom; it has something to be proud of; it has a splendid and ennobling means of self-expression.

Captain Alfred Ritscher

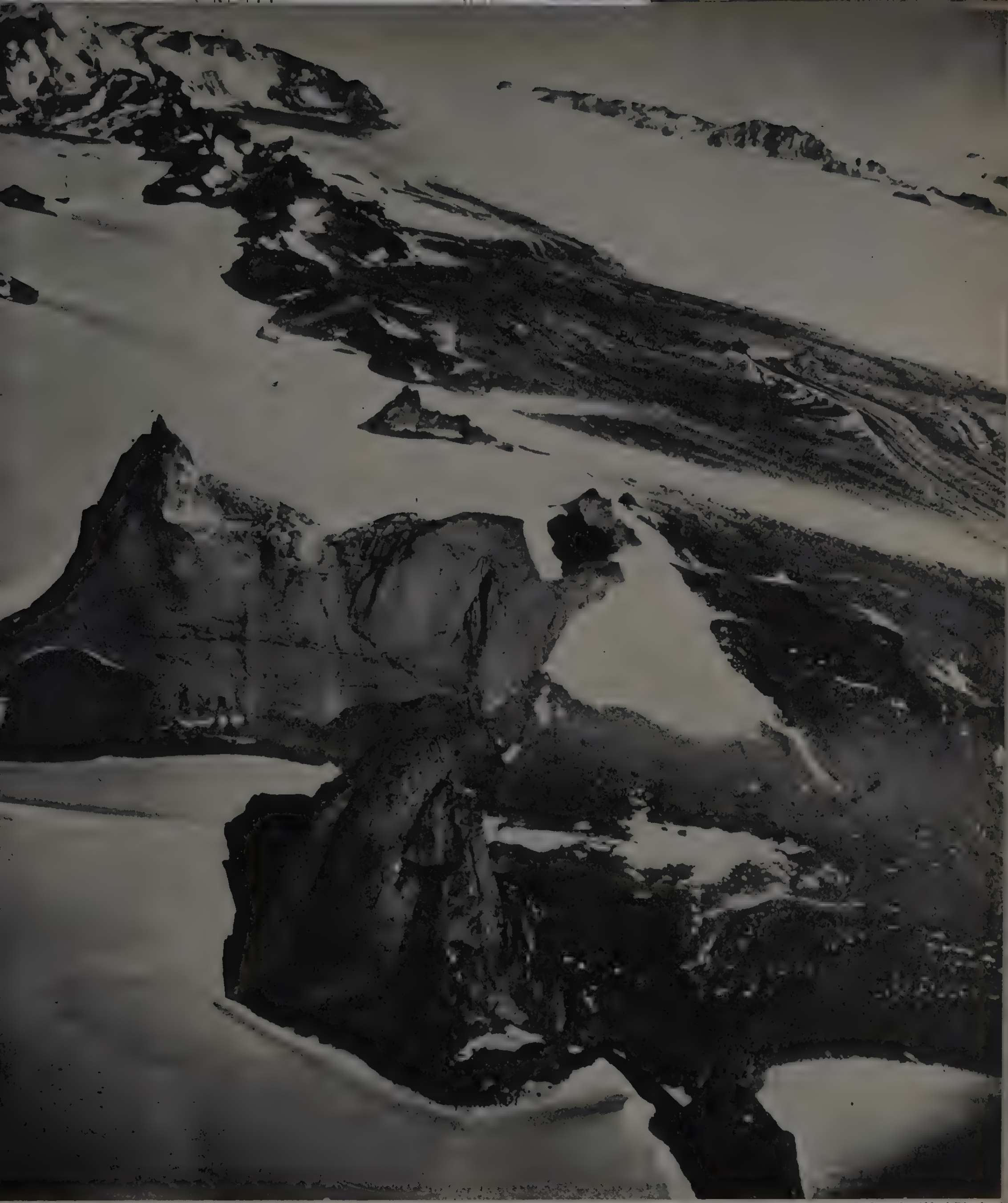
An International Expedition to Antarctica

by L. P. KIRWAN

Under Norwegian leadership an expedition comprising members from Norway, Sweden and Great Britain is leaving this month for Queen Maud Land. It is being financed by the three Governments; but we are proud to state that a first contribution of £2000 towards the cost of the preparatory work was made from the Trust Fund to which the founders of The Geographical Magazine *undertook to assign half its profits. The present article, by the Director of the Royal Geographical Society, will be followed by others exclusive to this Magazine, recording the progress of the expedition*

In his enthralling and tragic story of Scott's last expedition, Cherry Garrard describes Polar exploration as "at once the cleanest and the most isolated way of having a bad time which has yet been devised". If that is true—and not merely a modest reluctance to avow, with most Polar explorers, that the lure of ice and snow is every bit as powerful as the more widely advertised lure of the desert—then it has done nothing to deter the 200 or more expeditions that have battled their way to the discovery of Antarctic lands in the last 400 years. The latest expedition to explore this continent equal in area to Europe and the United States of North America combined is the Norwegian-British-Swedish Expedition to Queen Maud Land; one of the many regions of this vast land mass still untouched by man.

The motives behind these Antarctic expeditions have been almost as numerous as the countries that have launched them. The urge to test the myth of a fertile and temperate southern continent, the El Dorado of 18th-



Captain Alfred Ritscher

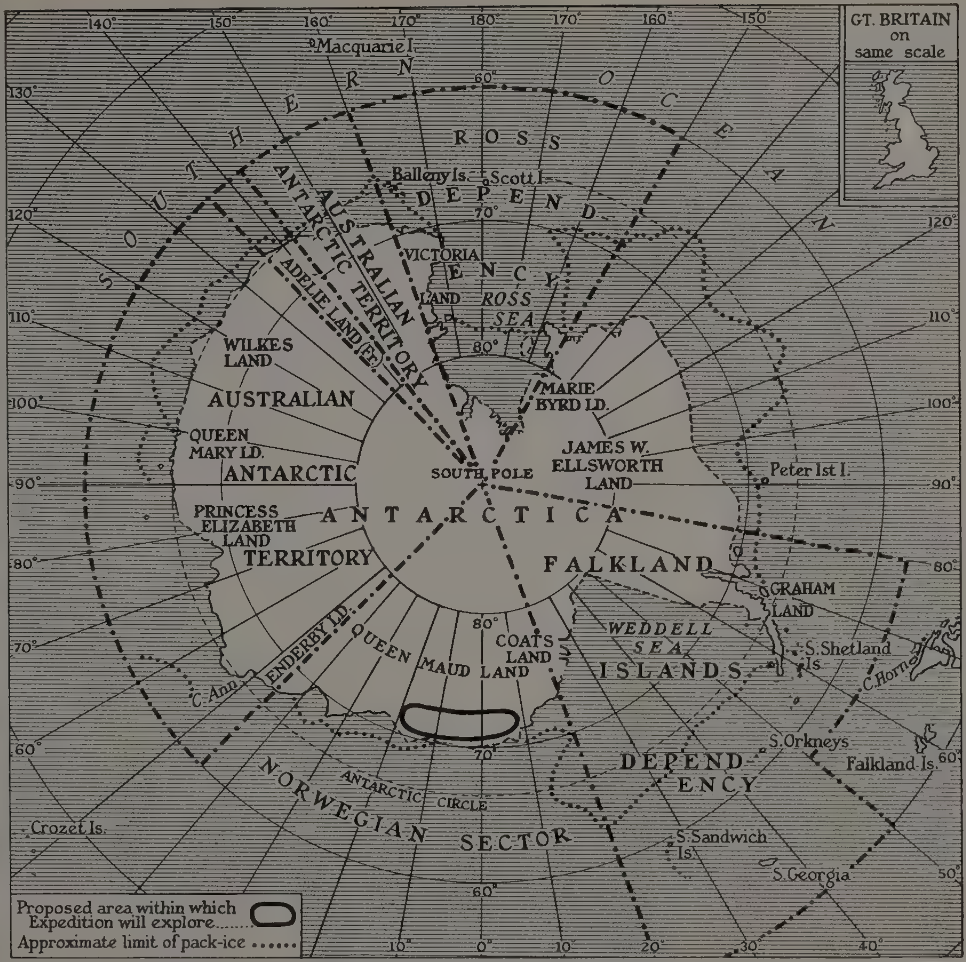
(Above) *The North End of Conrad Gebirge on Queen Maud Land, looking south. The southern peaks at the top left-hand corner of the photograph are 13,700 feet in height. On the right are moraines, indicating glacier recession. One of the objects of the expedition will be to study why the mountains are ice-free.* (Opposite) *The Drygalski range from the North-East, showing a quasi-Alpine topography. The sharpness of the peaks, a result of frost, shows that they have been free from ice some while* century philosophers and geographers; the rich prospects of the whaling and sealing industry; the needs of science and learning, obscured all too often by international rivalry in exploration; the rush to stake a claim, political, strategic, economic, in the partition of the "Last Continent"; all these have forced the pace of Antarctic exploration. How, then, does this new Antarctic venture fit in to this 400-year-old story?

First of all, it is not a national but a truly international expedition: and, as far as the Polar regions are concerned, that is a new idea. Men, money and equipment have come from all three countries; not, it is true, in equal proportions, for Queen Maud Land, at about longitude 0°, is in the Norwegian sector of the Antarctic and, for this reason, the expedition is under Norwegian leadership and the Norwegian Government is shouldering the main burden of finance. Secondly, the motives of the expedition are scientific. It is setting out not to stake any new territorial claims, nor to search for uranium ores to add new terrors to the world, but primarily to try and answer a specific question: "Is the climate of the world getting warmer?" It is a question originating not in the southern but in the northern hemisphere.

For some years now, Professor Hans Ahlmann, Swedish member of the Expedition's international organizing committee, has been collecting evidence which shows that the climate of the Arctic and sub-Arctic zones has been improving since the beginning of the century. The evidence has been accumulating gradually, so gradually as to escape the notice of any but scientific and specialist observers. It is no less dramatic for that. The shrinking of glaciers in Iceland has exposed land last cultivated 600 years ago. The pack-ice in the Polar seas has decreased to such an extent that the shipping season for the West Spitsbergen coalfields has lengthened from three to seven months. Air photographs taken in the U.S.S.R. show that between 1924 and 1944 drift-ice along the north Russian coast was reduced by no less than a million square kilometres. Climatological records tell a similar story, of rising winter temperatures and of a decreasing number of very severe winters over the last half-century, though there have of course been exceptions contradicting the general trend. In the field of biology, changed climatic conditions have caused a northward migration of certain types of fish: herring, halibut, haddock and especially

aptain Alfred Ritscher

The Luz ridge, 8800 feet high. This photograph and the previous two, heretofore unpublished, were taken by the Ritscher expedition of 1938, which surveyed the area from the air while dropping Nazi stanchions to claim the territory



A. J. Thornton

codfish. The codfish, it is calculated, has migrated 9° of latitude in twenty-seven years. It has now become the staple diet of the Greenlanders to whom at the beginning of the century it was virtually unknown. Almost unnoticed, a revolution is taking place in the northern fishing industry. The same thing is happening in agriculture and forestry. Better agricultural prospects in Northern Sweden and in Finland, extended barley cultivation in Iceland, a quicker and more extensive forest growth in Northern Scandinavia as a whole, are all signs of this climatic improvement which seems to be taking place in high northern latitudes. And not only there, for there is evidence of glacial recession from South America and East Africa and a lowering of lake levels in the Rift valley.

Now, you may ask, what has all this to do with the Antarctic and with the Norwegian-British-Swedish Expedition to Queen Maud Land? According to Professor Ahlmann, the Antarctic may easily be the key to the problem. At present, the most widely accepted theory of the cause of this fluctuation in climate is a variation, or rather an increase, in solar activity. If this is so, one would expect it to be a world-wide and not merely a local phenomenon confined to the northern Polar regions. The Antarctic is, obviously, the first area in which to continue the search.

In fact, the Antarctic and especially Queen Maud Land has already produced some evidence and it is largely from this that the whole idea of the Queen Maud Land Expedition grew. In 1938, a German expedition under the command of Captain Ritscher and sponsored personally by Field-Marshal Goering sailed for Queen Maud Land with an aircraft and a full complement of German Naval and Air Force officers on board. They had remarkable luck with the weather. But owing, no doubt, to more pressing commitments elsewhere, their time was short. Landing on the edge of the shelf-ice, they made a number of flights inland and—after hurling down iron stanchions stamped with Nazi emblems to stake a German claim to the territory—they returned home with very remarkable air photographs. Some were published by Captain Ritscher in a preliminary account of the expedition in 1942. Some he kept and made over to the expedition when he was found after a lengthy search in Hamburg earlier this year. The rest, and a large number of invaluable scientific records, were lost or destroyed during the war.

These photographs cover parts of the interior of Queen Maud Land lying between longitude 10° W and 20° E and latitude 70° to 73° S. They show a region of extraordinary interest from a glaciological and climatological point of view, large stretches of land free from ice and snow at the foot of needle-peaked and jagged mountains that stand out stark and sombre against the whiteness of the ice-cap; isolated, as Professor Ahlmann picturesquely says, like "oases in an ice desert". Into them flow glaciers which, to judge from the position of the debris carried down by the moving ice in earlier times, are now, like those in northern latitudes, smaller in extent than of old. Similar ice and snow-free areas were found by Admiral Byrd during the United States Naval Operation "High Jump" in 1946. Their importance in the study of global climatic improvement is obvious enough. This fascinating region with its curious, almost Alpine, topography will be the goal of the scientists on the Queen Maud Land Expedition.

To measure these glaciers on the ground and from the air, comparing the results with the air photographs and the air maps of the German expedition of 1938, will be one of the Expedition's main scientific tasks. This glaciological work, inspired by Professor Ahlmann's researches, will be the responsibility of Sweden, under the young Swedish glaciologist Walther Schytt. Glaciology will not be limited to glacier measurement. It will involve a study of the physical properties and of the structure of the inland ice in a search for some of the secrets of the geographical development of the World's Ice Age. In this glaciological work, a specially adapted boring machine made by the Canadian Longyear Company will be used so that ice temperatures down to about 100 metres may be recorded over the whole period of the Expedition's stay. An attempt will be made, too, to extract an ice core 150 metres long so that the crystallographic structure of the ice can be examined; in the same way as the Swedish scientist, Professor Pettersson, extracted cores from the deep ocean bed on the famous oceanographical cruise of the *Albatross* a year or two ago, to learn the geological history of the ocean floor.

Linked with this study of world climate is the study of Antarctic weather, not only to provide information for the whaling fleets operating off the coast, and to make the routine recordings of temperatures, humidity and wind at ground level and at various heights, but also to study the broader problem of the long-term effect of Antarctic weather conditions on the weather of neighbouring continents. For wind observations, modern science has provided an invaluable aid in radar-wind ("Rawin") apparatus for observing pilot balloons in all conditions of weather and for recording wind velocity and direction. This is one of the many war-time developments in science from which the Queen Maud Land Expedition will benefit.

Norway will be in charge of this meteorological work. The main task of the British scientists will be geology. No man has yet set foot on these snow-free and ice-free regions of Queen Maud Land and there is unusual scope for new discoveries, not only in terms of the wide variety of rocks and the complicated tectonics suggested by the air photographs but in the whole study of the geological relationship of Antarctica to the general structure of the southern hemisphere. There is, too, the possibility of economic discoveries. Mineral resources, coal, tin, lead and copper ores, even gold and silver in small quantities have already been found in Antarctica. Who knows what Queen Maud Land may not reveal? Even though no radioactive minerals or oil have yet been discovered, there is plenty of room for surprises in a continent of some 6,000,000 square miles.

That, in bare outline, is the main scientific work which the Expedition hopes to do. What about the men who are going to do it? They have to be more than good scientists. They have to be fit enough, resourceful enough and philosophical enough to stand the strain and face the dangers of Antarctic travel, probably the toughest form of explora-

The Time

The Times

(Above) *Huskies surround Mr E. W. K. Walton, Secretary of the British organizing committee, at their kennels at Telscombe, near Lewes, where they were in quarantine. Of Labrador stock, they were brought from the Falklands to Britain rather than divert the expedition on its way south. Fifty dogs will be taken, twenty being contributed by this country, with the rest from Greenland and Spitzbergen.* (Left) *'Gryshkin' looks after her sea-born family*

Air Ministry

Air Ministry

(Above) *The starboard wing of one of the two Austers which will accompany the expedition being stripped. They will assist in finding channels through the pack-ice, and bases on the mainland. In the foreground are Squadron Leader G. B. Walford (right) and Flight Lieutenant H. M. H. Tudor, D.F.C., and behind them Sergeant P. D. Weston, B.E.M. (right) and Corporal W. B. Gilbey, (kneeling) four of the crew of five.* (Left) *One of the Austers in flight. They will have both skis and floats fitted* tion in the world, and to cope with the inevitable petty irritations of life for thirty months in close contact with a few companions in a place as isolated and often as bleak as any to be found.

Out of a total of fourteen men, led by an experienced Norwegian Arctic explorer, Captain John Giaever, who will spend more than thirty months on the Ice-Cap, there will be four British scientists. In addition, there will be an R.A.F. Flight, operating during the summer under the command of Squadron Leader Brian Walford, which, with its five men and two light Auster aircraft, will be used mainly for reconnaissance work. Chief of the British scientists is G. de Q. Robin, lecturer in Physics at Birmingham University, an Australian from the University of Melbourne. Both he and the assistant geologist, Alan Reece, from the Imperial College of Science and Technology of the University of London, have had previous Antarctic experience with the British official expedition which has been surveying the Antarctic dependencies of the Falkland Islands. E. F. Roots, senior geologist, comes from Canada and has been studying at Princeton University, U.S.A. Then there is Charles Swithinbank, the youngest member of the party, geographer and glaciologist from Oxford University, whose last expedition with the Oxford University Exploration Club took him to the mangrove swamps of West Africa.

For the last two years, plans have been worked out at the Norwegian Polar Institute at Oslo, at the Royal Geographical Society, which is the Expedition's headquarters in Great Britain, and at the Scott Polar Institute at Cambridge, under the general direction of Professor Harald Sverdrup, the distinguished Norwegian oceanographer who sailed with Amundsen in the famous voyages of the *Maud*. Administrative preparations have been a good deal more complicated than would be the case with a purely national expedition. Each country has had an organizing committee—in England a joint committee of the Society and the Scott Polar Institute at Cam-

Mr E. W. K. Walton, who has been responsible for the equipment of the International Expedition to Antarctica, with models of the tents, sledges with plastic runners, dog-whips, and ration-boxes to be used. Mr Walton gained recent experience on the Falkland Islands Dependencies expedition

J. Allan Cash

bridge—with a secretary, in the British case E. W. K. Walton whose recent experience with the Falkland Islands Dependencies expedition has been of great use in dealing with problems of modern equipment, revolutionized in many cases by the inventions of the last war.

Equipment has been provided from all three countries according to what each could best provide. Prefabricated timber houses for the base station have been specially made in Sweden, incorporating the lessons of previous expeditions. Sweden has also supplied most of the food. Norway has specialized in ski equipment and in polar clothing, including the traditional heavy furs and sleeping-bags of reindeer skin from Lapland. Perhaps the most important items of equipment on any polar expedition are the sledge-dogs, still the most reliable method of transport in the Polar regions. Thirty specially bred huskies were brought from the Falkland Islands Dependencies in June and have spent an unexpectedly torrid summer at Telscombe on the slopes of the South Downs. Others have been carried over from Greenland to Norway. Transportation provided by these dogs and the aircraft has been reinforced by three tracked snow-vehicles, known as "Weasels", which will be used for dragging sledges carrying heavy gear once a safe route has been reconnoitred by the sledging teams. The sledges themselves are a British invention. Made in a new design of laminated wood, they have plastic running surfaces. These have gone through rigorous tests at the Low Temperature Laboratories at Cambridge and on trials in the Antarctic itself they have shown hardly any signs of wear after a sledging journey of 1200 miles over some of the roughest going. Experiments in sledging rations in this country have succeeded in producing a twenty-day ration, worth 4000 calories a day and weighing no more than forty pounds including packing. Tents are of a special "Ventile weave" windproof cloth first made during the war. And all the woollen clothes for the Expedition are coming from this country, supplied by the same firm that equipped Scott's and Shackleton's men.

These are only some of a long list of equipment, ranging from pressure cookers to precision instruments, generating plant and radio gear, which are a tribute to British Industry's ingenuity and traditional readiness to help forward exploration. Some of the heavy gear, the tracked vehicles, and the dog teams will shortly leave Sandefjord, near Oslo, on board a whaling factory ship southward bound The 700-ton expedition ship, the *Norsel*, which will shortly leave England, is to take the aircraft, specially crated for the voyage, and most of the wintering party. One of the most difficult tasks will be the rendezvous with the whaler in Antarctic waters and the trans-shipment of the gear and stores from the whaler. Then will come the crucial time, the strenuous effort to reach the continent and make safe landfall. Only two expeditions have so far succeeded in nearing the coast of Queen Maud Land and last year the French expedition to Adélie Land was beaten back by the dense and dangerous pack-ice. In Antarctic exploration, a landing can never be taken for granted. There is not only the pack-ice to contend with. There is the treacherous coastal ice itself which so often breaks away unless securely grounded on the land. And there is always the chance of the sudden Antarctic blizzard which may easily sweep the ship miles from the coast at a critical moment in the landing.

Once the landing is safely carried out and the base camp established—this will take most of the first season—the *Norsel* will return to Europe, coming south again the following year with a larger aircraft to carry out an extensive air survey. Then the long sledging journeys will begin across the Ice-Cap, with its deep and dangerous crevasses, to the mountains inland where the chief hopes of the scientists lie.

What new discoveries the Expedition will make, what exploits of endurance will be added to the annals of Antarctic exploration, readers of *The Geographical Magazine* will hear in subsequent articles from members of the Expedition. To forecast too much would be rash. But if luck holds and the carefully prepared scientific programme can be carried out, the Queen Maud Land Expedition may well prove to be the most important to leave European waters for many years.

The international character of the Expedition is in many ways its most striking feature. International cooperation has been sadly lacking in Antarctic exploration hitherto. Without it, many of the scientific problems to which the Antarctic holds the key—especially in meteorology—will remain unsolved. The initiative of Norway in promoting this three-nation Expedition is a step in the right direction. If the Expedition succeeds in furthering international scientific cooperation among the many countries with interests in Antarctica, it will have earned its place in Antarctic history. For Norway and Great Britain, it is a striking contrast to the tragic rivalry of Scott's and Amundsen's day.

The Men Behind Modern Geography

II. Alexander von Humboldt

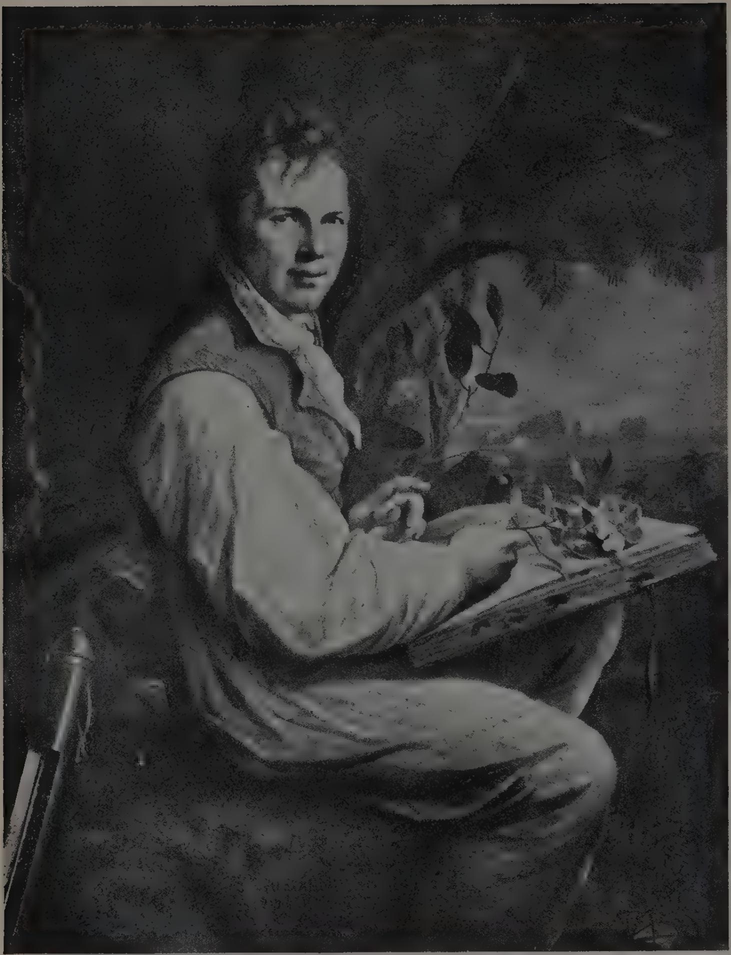
by G. R. CRONE

The present series of articles, by the Librarian of the Royal Geographical Society, is designed to show how and, chiefly, through whom the modern concept of geography has taken shape. His first article dealt with an Englishman, Sir Joseph Banks; his second introduces a German who insisted that the physical description of the world "is not a mere encyclopaedia of certain separate sciences", but that these "are to be studied as reacting upon and modifying each other"

Alexander von Humboldt, the founder of modern geography, was born in 1769, the year in which Cook sailed in the *Endeavour*, and died in 1859, the year of the publication of Darwin's *Origin of Species*. In many respects his work linked these two stages in the development of our conception of the world. From observations in part gathered on his own journeys, in part gleaned from the records of others, he strove to build up a rational description of the universe. In his approach to this task he was fundamentally influenced by the philosophical, scientific, and literary ferment of the late 18th century.

A member of a Prussian family of standing and wealth, he received at Göttingen and Frankfurt a sound training in biology, geology and, significantly, in political economy, for he was originally intended for the public service. In 1790 he travelled in Western Europe, including England, in the company of Georg Forster, who as a boy of seventeen had circumnavigated the world on Cook's second voyage. He then entered the Prussian civil service as an inspector of mines, a post which gave scope to his bent for geology. Determined to devote himself to the study of nature, however, he threw up this post after a few years. This resolution had first been formed in early youth when he had been profoundly impressed by the descriptions of natural beauties in Forster's works, by the paintings of Indian scenes by William Hodges, and by the sight of a giant dragon-tree in a Berlin botanical garden. At this period he was on intimate terms with Schiller and Goethe, and their influence is strongly reflected in his attitude to nature and in his attention to literary style. After several plans for foreign travel had failed he eventually reached Spain, accompanied by Aimé Bonpland, a botanist of repute, whom he had met in Paris. Humboldt made a good impression at court and obtained permission to travel freely through the Spanish territories in the New World. This was particularly welcome, for he had come to the conclusion that voyages of circumnavigation, then so popular, had largely served their purpose, and that further advance was dependent upon penetrating the interior of the continents. He saw himself, moreover, not as an explorer but as a scientific traveller.

Humboldt and Bonpland accordingly sailed for Venezuela in 1799. The next four years were crucial in the development of Humboldt's thought. During this period he travelled over the Venezuelan *llanos*, from Caracas to the Orinoco and Rio Negro, up the Rio Magdalena, across the Andes and along the high interior valleys to Bogotá and Quito; and finally through the coastal plains and high plateau of Mexico. The industrious and determined travellers accumulated a great mass of records on all aspects of these countries and their peoples. Bonpland was mainly occupied in collecting and preserving several thousands of botanical specimens. Humboldt's merit as a traveller was to apply recent technical advances to the work of survey; he was one of the first to use the improved chronometer for the observation of longitudes on land and the barometer for the determination of heights. He fixed over two hundred astronomical positions, mapped a portion of the course of the Casiquiare Canal—the river which through bifurcation flows both to the Amazon and to the Orinoco—collected geological specimens, noted the appearance and habits of the peoples, and gathered documents on economic and political conditions.



Alexander von Humboldt (1769-1859) resigned from the Prussian civil service to pursue the study of nature. His reputation was based upon four years' travel in South America and Mexico. In the portrait (left) *the artist, Weitsch, symbolizes two of Humboldt's interests, botany, by the herbarium, and mapping, by the barometer* (lower left), *used for determining heights. Humboldt was the first to examine systematically the relation of vegetation types to climate and altitude*

Picture Post Library

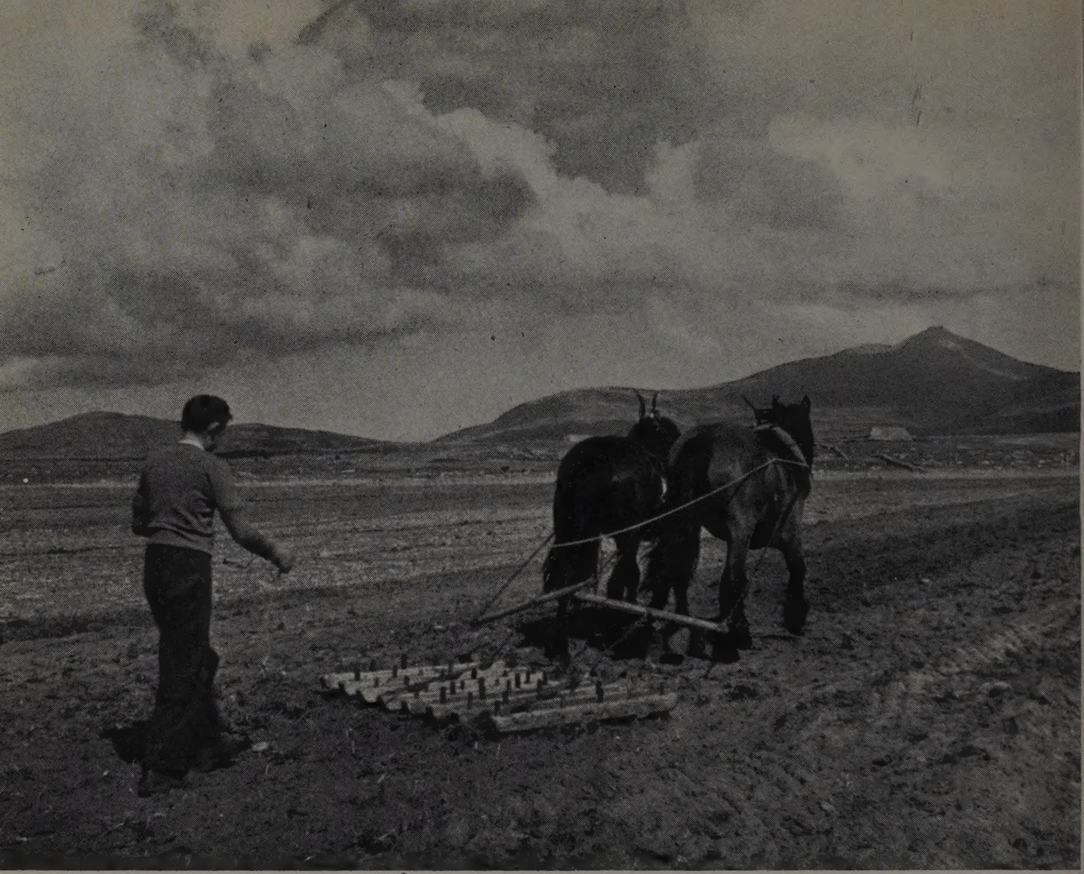
The collation of this material for publication occupied Humboldt, Bonpland, and numerous assistants for twenty years after the return to Paris, where he was permitted to reside for this purpose by the King of Prussia. Of special note among the many volumes are the narrative of the journey, the discussion of the geography of plants, and the *Political Sketch of New Spain.* The latter was notable as the first attempt to relate the political and economic conditions of a country to its physical geography and resources, natural and human. Paris was then the centre of geographical progress, signified by the foundation there, with Humboldt's cooperation, of the first geographical society in 1821. Six years later he was called back to Berlin, and began to deliver at the university those lectures on the physical world which set the seal on his international reputation. For the remainder of his long life he virtually occupied the position of scientific adviser to the King of Prussia, and was thus able to encourage research in many parts of the world. The most ambitious of his later journeys was undertaken for the Tsar, who despatched him with an elaborately organized party to the Urals and the Altai, mainly to report on the mineral resources. His observations on the alignment of the mountain ranges of Central Asia had some contemporary value.

Humboldt's general standpoint is set out in his *Kosmos; a Sketch of a Physical Description of the Universe*, which was based on his Berlin lectures. Influenced by contemporary idealist philosophy, he proposed to demonstrate "the harmonious unity of the Kosmos" from "the remotest nebulae" to "the most minute organisms of animal creations and to delicate vegetable germs", to relate cause and effect, and to trace out the interplay of natural laws throughout the universe. He was also interested in the reaction of human beings to the world around them, and the *Kosmos* includes a lengthy discussion of "the nature of our knowledge of the external world and its different relations, in all epochs of history, and in all phases of intellectual advancement". In his far-reaching scheme he accepts for the terrestrial portion the denomination of physical geography. To this contributions are made by general physics, descriptive natural history, geology, and comparative geography. He insists, it is important to note, that the physical description of the world is not a mere encyclopaedia of these separate sciences. They are to be studied as reacting upon and modifying each other. Nor, equally significant, is the student of the physical world to concern himself with the technicalities of each separate science. He is to consider the phenomena with which they deal "only in their mutual connection, in relation to the different zones of our planet, and to its physical constitution generally". Moreover, the enumeration of peaks, volcanoes, rivers and their tributaries is no part of physical geography; this belongs to what he understands as "geography properly so called". This distinction was to have unfortunate results, as it tended to perpetuate the "capes and bays" type of geographical teaching, divorced from a reasoned context.

It was perhaps more by his work on the contributory sciences than by his general theory that Humboldt advanced the development of geography. His contributions to the evolution of a geographical technique were notable. In his journeys in the tropics he was constantly impressed by the dominant role of the plant life in the landscape, and the relatively rapid transition with increasing altitude from one dominant type to another, from the tropical jungle of the coasts to the sub-arctic desert of the summits. He saw that the controlling factor was the total annual amount of heat and its distribution throughout the seasons. This led him to examine the great climatic zones of the world as determined by position on the globe, physical configuration, and the systems of winds and currents. On account of these studies, he can be claimed as the founder not only of plant geography but also of modern climatology. By his device of isothermal lines of mean annual temperature he introduced precision into the study of its distribution, and this method was rapidly extended to other elements, e.g. barometric pressure and rainfall, and eventually to many kinds of statistical information. Similarly in studying the surface configuration of a country he employed the device, borrowed from the canal engineers, of the vertical section. By his emphasis on the importance of maps, he gave a considerable impetus to the progress of cartography in Germany. Berghaus' *Physical Atlas* (1852) largely reflected Humboldt's ideas, and Justus Perthes, the founder of the great cartographical institute at Gotha, was also inspired by Humboldt's pioneer work.

In other directions Humboldt's ideas were equally fertile. The importance of his *Political Sketch of New Spain* has already been noted; and his *Views of Nature*, in which various natural regions of the world are contrasted, is still regarded as amongst the best descriptions of natural scenes in German. He always maintained that scientific results should be presented in an agreeable literary style, with due appreciation of the aesthetic appeal of nature. On his journeys he carried with him Bernardin de St Pierre's *Paul et Virginie*, which he valued highly for the "marvellous truth with which tropical nature is described". The immediate successors of Humboldt were the naturalist travellers of the type of Robert Schomburgk and the Schlagentweit brothers, and later Wallace, Bates and Spruce. Humboldt also stimulated progress in the physical sciences contributory to geography—terrestrial magnetism, meteorology, plant geography, and physical geography. He did not succeed, however, in establishing the whole universe within the bounds of a single integrated science, so that his immediate influence on general geographical theory was not great. His friendly rival, Karl Ritter, who limited the scope of geography to the earth's surface and related phenomena, and included man within its subject matter, was for a time the unchallenged arbiter of the geographical world. Later, there was some reaction from Ritter's theories as to the influence of geography upon human history. A tendency to lay emphasis upon the physical aspect of geography gained favour, and in this atmosphere, Humboldt's services were again sympathetically appreciated.

For the collection of miscellaneous observations, Humboldt substituted an orderly system of cause and effect. Though opinions have since differed on the scope of the subject, this conception of geography, characterized by Professor E. G. R. Taylor as "a study of the 'interrelatedness of things'", has remained fundamental.



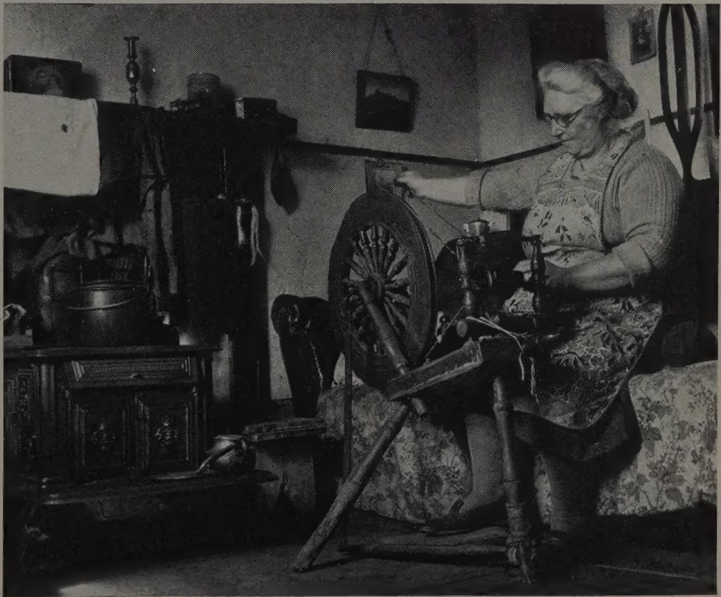
Hebridean Scenes

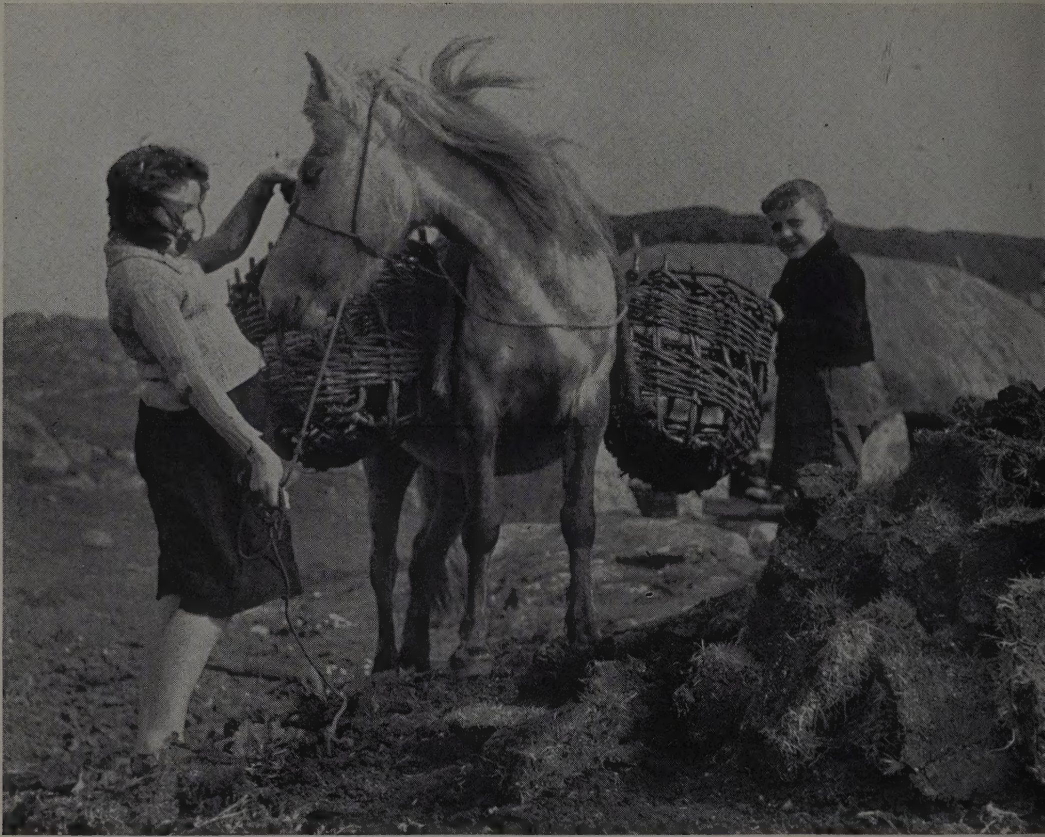
Notes and Photographs by J. ALLAN CASH, F.I.B.P., F.R.P.S.

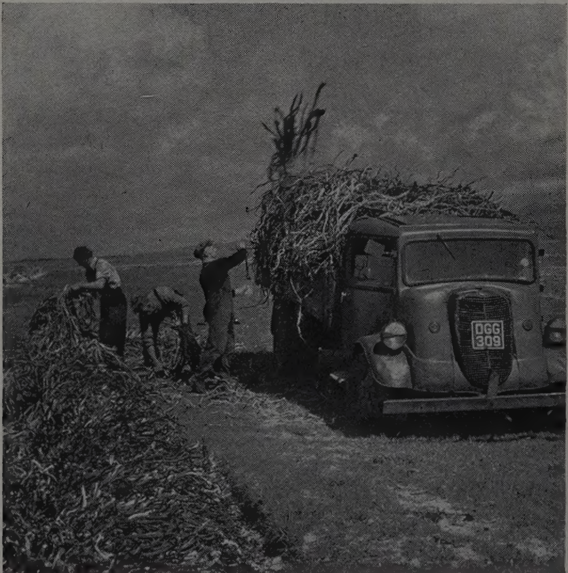
The people of the Outer Hebrides are busy and industrious folk. Their islands are so cut-off from the mainland that they have to be as self-sufficient as possible. Most spend their time farming, spinning, weaving, or peat-cutting. At times in the past life has been very hard and many have had to emigrate so that those who were left should have the bare minimum for survival. Today things have changed for the better, due largely to the war and continuing government aid. With good prices offered for cloth, the Harris tweed industry is booming. Farming is no longer a depressed industry, as agricultural subsidies apply here equally with the rest of Britain. Fishing, long a staple industry of the islands, has now been given an assured market. A newly-erected factory is processing the seaweed which winter gales throw up on the western shores. A fuel shortage is out of the question with such an ample supply of peat as is to be found over most of the islands. For the Hebrideans, the toil of cutting and carrying it is all in the day's work. Neither their stern life, nor their past suffering, nor their present security have diminished the courtesy and friendliness shown to strangers. Their gentle and melodious tongue provides a delightful background to English or their native Gaelic. The wild storms, the soft sunshine and the incredible colours all combine to weave a spell that draws back both emigrant islander and passing stranger to these islands.

(Above) *Cultivating the land is often difficult, for much of the country is rocky and hilly, and the soil too peaty. The crofter who owns land on the 'machair' or coastal plain of South Uist instead of on some steep hill-side is very lucky*

Sheep are to be found on all the islands and are Black-Faced or Cheviots or a cross between the two. Every June or July they are rounded up to have the wool clipped and the flocks counted. The wool is the foundation of Harris tweed. Much of the spinning is done on spinning-wheels in the crofters' homes, but the mills at Stornoway also help to supply yarn to the weavers. Weaving is done entirely at home on hand or treadle looms







On good days in the summer the crofters cut peat. To dry, the peats are first laid flat on the ground, then tilted against one another. Then they are carried home by cart or maybe in creels on a pony. (Left) *Stem seaweed is gathered and dried on South Uist, one of the larger islands, after winter gales. During the summer it is taken to a factory near Lochboisdale, the main town, for further drying and for pulverization. The powder is a raw material for commodities ranging from surgical dressings to nylon*